THE ROLE OF EDUCATION AND TRAINING IN THE DEVELOPMENT OF THE MALAYSIAN ECONOMY

By

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DECLARATION

I hereby certify that the work embodied in this thesis is the result of my own investigations except where reference has been made to published literature.

I declare that this work has not already been accepted in substance, nor is it currently being submitted in candidature for any other degree.

Abstract

This thesis aims to examine the role of education and training in Malaysia via the analysis of its impact on an individual. To do this, we have used a conventional human capital earnings function. Our findings show that there are positive and high returns to education in Malaysia. Our findings also indicate positive returns to training for a randomly selected group of women extracted from the Malaysian Family Life Survey data sets. This examination on training has been extended to include the determinants of training analysis and we have found that (a) training and education are complements and (b) women tend to be deterred from participating in training if they are credit constrained. The rates of returns to education in Malaysia are updated via the usage of the 1997 Malaysian Household Income Survey data set. The rates of returns to the different levels of education remain high and positive in Malaysia. We have also been able to form the trends of the returns to education using 6 sets of the Malaysian Household Income Survey data. The returns to education in Malaysia remained stable from 1984 to 1997 with the exception of the tertiary education level, where the returns were increasing over time. In order for the returns to education to be stable over time, the demand for skilled labour must have increased alongside increasing supply of skilled labour. This prediction is confirmed via our demand and supply framework analysis. The results do show that relative demand for skilled labour has increased alongside the rising relative supply of skilled labour. Our results also show that there are higher returns accrued to the higher levels of education, namely at the pre-university and higher education level. This condition of higher returns to higher levels of education is possible given the stages of rapid industrialisation in Malaysia. We conclude this thesis with a brief investigation into how the rates of return estimates can play a more prominent role in the Malaysian skill formation process. This investigation is done with the help of the developmental state skill formation model. We detect a plausible role of the rates of returns to education estimates in the Malaysian skill formation framework. We conclude that the role of education and training in Malaysia has been positive and has the potential to continue doing so.

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All errors remaining in this thesis are mine.

"How much better to get wisdom than gold, to choose understanding rather than silver"

Proverbs 16:16

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INTRODUCTION

1.1 THE PURPOSE OF THE STUDY

The Malaysian Government spent 7.8 percent of its total development expenditure on education and training for the period 1966-1970. This percentage of expenditure on education and training increased to 10.1 percent for the period 1986-1990 and for the period, 1996-2000, an allotment of 15.1 percent of total expenditure was set aside for this sector of the economy. The allocation for education and training increased to 20.6 percent in the Eighth Malaysia Plan, 2001-2005. The increase in government expenditure on education and training gives an indication that there is a role to be played by this sector in the economic development of Malaysia. Malaysia achieved an average growth rate of 6.7 percent during the period, 1966-1999.[1] According to the Barro and Lee (1993, 2001) estimated education data set, Malaysia's average years of schooling increased from 2.88 years in 1960 to 6.04 years in 1990 and to 6.49 years in 1995. The average years of schooling is projected to increase to 6.80 years[2] in 2000.

Malaysia has the highest education expenditure as a percentage of its GDP during the period 1983 to 1999 when compared with Korea, Singapore, Hong Kong and Taiwan.

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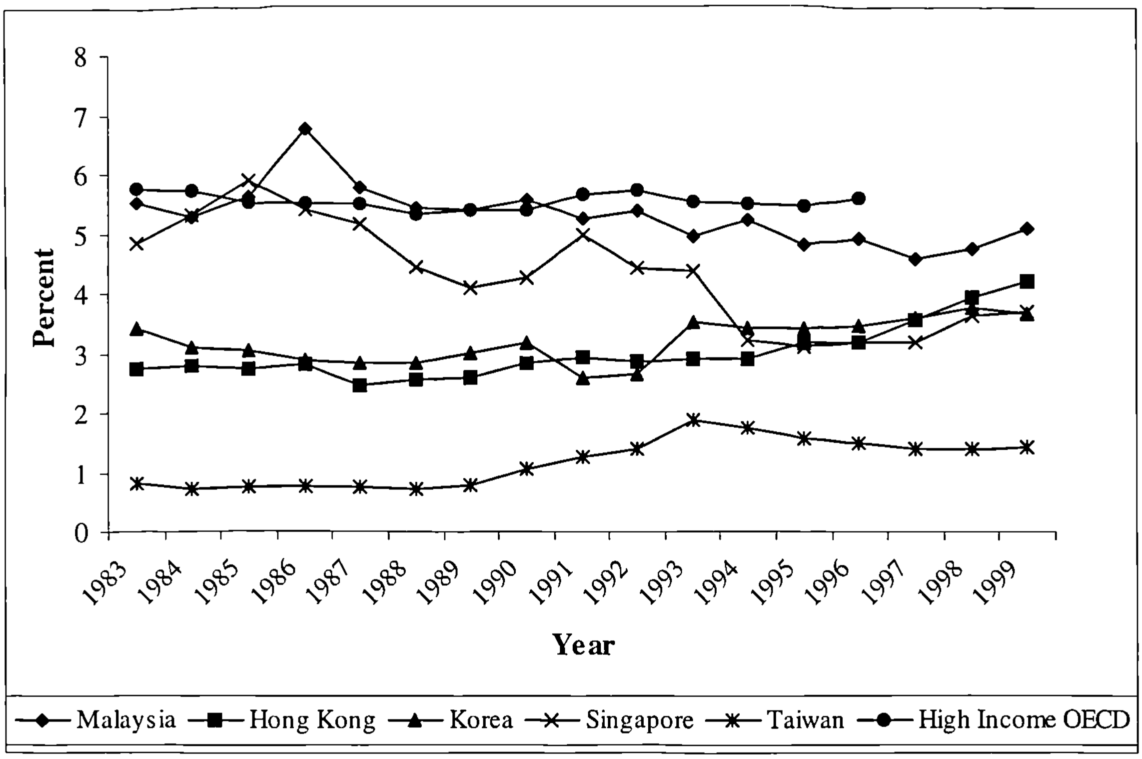
[1] The figure obtained is from our own calculation using the data from the World Bank Development Indicator, 2000.

[2] We would be able to verify this estimation for the year 2000 in the year 2002 given that official and actual data for a particular year will be released within a two-year period.

The Malaysian figures are almost comparable to the OECD educational expenditures (as a percentage of GNP) as indicated in Graph 1.1.

Graph 1.1: Educational Expenditure (as a Percentage of GDP), 1983-1999



Notes:
The OECD educational expenditures are as a percentage of GNP and data is only available till 1996.
Source:
Malaysia, Hong Kong, Korea, Singapore and Taiwan figures - Calculation based on data obtained from the Asian Development Bank.
(http://www.adb.org/Documents/Books/Key_Indicators/2001/default.asp)
OECD[3] figures: World Bank Development Indicators on CD-ROM 2000.

[3] The High OECD income countries include countries with GNP per capita of US$9,361 or more. The 23 economies include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

Throughout the development of Malaysia, education and training has been a means of integrating the three major races in Malaysia to form one nation. To achieve this, focus was given to primary education and the forming of a national education system in the 1950s. In the 1960s, emphasis shifted to secondary education and to vocational and training education while in the 1990s attention was given to the tertiary education level.

Education has been an important instrument for the achievement of national unity, firstly through the implementation of the National Economic Policy (NEP) in 1970. This nation building role continued into the 1990s, where

> "Education and skill training is accorded high priority in nation building in order to provide a sufficient pool of well-educated, highly skilled and strongly motivated labour force as well as to produce responsible citizens with high moral and ethical values"
>
> Seventh Malaysia Plan 1996-2000

In 1990, the Malaysian Prime Minister launched Vision 2020. The ultimate objective of Vision 2020 is that Malaysia will be a fully developed country by the year 2020. It is envisaged that Malaysia should not only be developed in the economic sense but will be a nation that is fully developed in all dimensions: economically, politically, socially, spiritually, psychologically and culturally. Two of the nine challenges of the vision cover economic matters, i.e. (i) the challenge of ensuring an economically just society. This challenge refers to a society in which there is a fair and equitable distribution of wealth, and in which there is full partnership in economic progress, (ii) the challenge of establishing a prosperous society, with an economy that is fully competitive, dynamic, robust and resilient. This vision and the development objectives are set out in the Sixth Malaysia Plan, 1991-1995 and the later plans that follow, i.e. the Seventh Malaysia Plan, 1996-2000 and the most recent plan, the Eighth Malaysia Plan, 2001-2005. These plans outline the development guidelines calling for better human capital development, thus indicating further recognition of the importance of the education and training sector.

The main aim of this thesis is to examine the role of education and training in the development of the Malaysian economy from the perspective of an area in economics, i.e. the economics of education. By accomplishing this aim, we will be able to obtain the following estimates: -

(a) The gross returns to training for a randomly selected group of women in Malaysia

(b) The determinants of training based on this randomly selected group of women in Malaysia

(c) Updated rates of returns to education estimates for Malaysia and

(d) The rate of returns to education trends from 1984 to 1997 for Malaysia.

The significance of these estimates will be discussed in section 1.3 later in this chapter.

1.2 THE SCOPE AND METHODOLOGY OF THE STUDY

There are two main branches in economics; we have the micro level economics and the macro level economics. In investigating the impact of education and training, macro level research would examine the contribution of this element (the term usually used in reference to education and training is human capital[4]) on economic growth. This macro level research investigates the contribution or share of capital, labour and human capital on the growth of an economy, which also leads to the calculation of the total factor productivity of an economy, which depicts technology change.

The approach that we have chosen to take in investigating the role of education and training in Malaysia is a micro level approach where we investigate this issue at the individual level. This has been made possible through the usage of various micro data sets.[5] This micro data set contains information of individuals living in Malaysia and encompasses detailed information on their income(s), education level and other personal characteristics such as age, marital status, location, stratum, employment status and other variables linked to their earnings. By having such data, we are able to estimate the returns to education and training, which we will utilise to examine the role of education and training in Malaysia. The first of these data sets comprise of the Malaysian Family Life Surveys (MFLS), i.e. the 1976/77 first Malaysian Family Life Survey and the second Malaysian Family Life Survey, which was conducted in 1988/89. The second set of data is the Government collected data set, the Malaysian Household Income Survey (HIS) for the years 1984, 1987, 1989, 1992, 1995 and 1997.

[4] Throughout this thesis, the terms education and training and human capital are used interchangeably.
[5] Two of the eight data sets that we have used in this thesis are publicly available on the World Wide Web while the remaining six data sets were available via the co-operation of the Economic Planning Unit, an agency within the Malaysian Government.

In general, there are three micro methods to estimate the returns to education. There is the short-cut method, the earnings function method and the full method or better known as the cost-benefit analysis. In this thesis, the returns to education and training will be estimated using the Mincerian Earnings Function or the human capital earnings function. In estimating the returns to training, the basic human capital earnings function is augmented to include the training element. The availability and insertion of the training element in the regression allows us to obtain rough estimates of the returns to two groups of females in Malaysia.[6] In the updating of the Malaysian returns to education, the basic human capital earnings function is used together with a set of control variables in estimating the average returns to the different levels of education. Given the type of data that we have, the earnings function would appear to be the most efficient method to use.

1.3 THE SIGNIFICANCE OF THE STUDY

The returns to education and training are calculated and researched comprehensively in this thesis. These returns are calculated with education and training as investments in mind and it is these returns that will be able to allow us to identify if the investments are profitable or not. These returns to education and training estimates will provide a picture of the impact of education on an individual. This thesis and the estimates that we obtain will contribute to the existing literature in the Malaysian economics of education in the following ways.

[6] We restricted this part of the thesis to females only due to the nature of the random sample in this data set.

Firstly, to our knowledge, this is the first study, which investigates the gross returns to training for an individual. Our literature search will reveal that there are three studies available pertaining to training. The first paper is a research paper conducted by Lee in 1989[7] (quoted in Lee et.al, 1995), which investigated the returns to different levels of formal vocational training. A weakness of this paper is that the analysis is confined to the formal training that a person seeks and obtains from private and public institutions in Malaysia. Therefore, it does not cover other training types such as on-the-job training obtained by an employee in the public and private sector firms. The second and third study is a PhD research conducted by Wan Abdul (1995) and by Tan and Batra (1995) of the World Bank. These latter researches had investigated training conditions and impacts of training at the firm level and not from the perspective of an individual.

Other than being able to provide gross estimates to training for two groups of women in Malaysia, we are also able to identify the determinants of training. The findings of the determinants of training constitute the second contribution of this thesis. There are currently no studies, which have looked into this issue in the Malaysian context.

The third contribution is the updating of the returns to education estimates for the Malaysian population. In our literature search, the latest and most comprehensive set of returns to education was estimated and calculated using information collected in the

[7] An attempt was made to retrieve this research paper during out visit to the Economic Planning Unit in the summer of 2000, however the paper was not obtainable.

Socio-economic Sample of Households of 1967 (Hoerr, 1973). We consider the study by Hoerr as the most comprehensive out of all the rate of returns to education studies that we have identified as he had used the full method to estimate the private and social returns to education for Malaysia. Following this study by Hoerr, there are other studies, which we will review in Chapter 4 of this thesis. The last set of the returns to education estimate was a study by Lee and Sivanathiran (quoted in Lee, et.al, 1995) that was conducted in 1992. In Chapter 4, we will find that these estimates were confined to a certain group of people in Malaysia. This does not give us estimates, which are representative of the Malaysian population. In this thesis, we will use the 1997 Household Income Survey (HIS) to give us the updated estimates of the rate of returns to education in Malaysia.

The analysis of the behaviour of the returns to education over time allows researchers to match available economic and labour market theory (e.g. diminishing marginal returns to capital) with empirical evidence. The pattern of the returns to education are also used as a tool for policy makers in their decision making, especially in the areas of educational expansion and educational planning. The trend of the returns to education in Malaysia can be analysed via the comparison and contrasting of results obtained from various returns to education studies conducted during different time periods. Although this method would be able to provide researchers with an indication of the trend of the returns to education for Malaysia, the trend that is formed could be inaccurate. The individuality of each study means that the results would not be drawn from a consistent set of analysis for the different time periods, as each study would have used different data sets and different equation specifications. These differences would raise doubts as to whether the changes in the trend are caused by the differences in the framework of the research or if they indeed reflect the changes in the rate of returns to education. The fourth contribution of this thesis is built on the usage of 6 sets of consistently collected data from the HIS 1984, 1987, 1989, 1992, 1995 and 1997 with a view to form and investigate the pattern of the returns to the different levels of education in Malaysia.

We also intend to investigate the issue of self-selection among the females in Malaysia in this thesis. We adopt the Heckman 2-step procedure to investigate how self-selection, a concept conventionally claimed to have more impact on females than males, affects our rate of returns to education trend for females in Malaysia. To the best of our knowledge, there are no studies on the returns to education in Malaysia that has taken this issue into consideration. The studies that are available are first-generation type studies, which do not consider the self-selection issue. This is our fifth contribution to the existing literature on education and training in Malaysia.

We will also attempt to fit the HIS data into a simple demand and supply framework developed by Katz and Murphy (1992). This framework allows us to determine the driving force of the changes in the relative wage trend in Malaysia. This analysis will be able to provide us with a formal explanation of the Malaysian returns to education pattern.

We endeavour to use the empirical findings noted above to investigate the role of education and training in Malaysia, which we hope, will be noteworthy contribution to the knowledge that we currently have on the education and training sector.

1.4 THE OVERVIEW OF THE CHAPTERS

This thesis is divided into 9 chapters. This chapter is the introductory chapter where we provide a brief overview of the entire thesis. Chapter 2 will provide the background to this thesis. This chapter will be divided into two parts. The first part will detail the stages of growth and development in Malaysia. To facilitate this discussion, we will look into the three time periods of 1957 to 1970, 1971 to 1990 and the period from 1991 onwards. These three periods have been selected based on the development of the overall economic policies in Malaysia, i.e. Pre-NEP (New Economic Policy) period (1957-1970), NEP period (1971-1990) and the New Development Plan period (1991-2000).

Within each period that we have selected, we will examine the stages of growth and development in Malaysia by presenting minor sections on the political and social condition of the country, followed by the trends of the overall economy (e.g. economic growth, inflation rates, saving rates and investment rates). We will also look at the sectoral trends (e.g. contribution of each sector as a percentage of GDP, employment trends and trade contribution) of the country and some of the main policies that guided the development and growth of the economy. We will also provide an insight into the development of the education and training sector within each period of development.

The second part of chapter 2 will contain an examination of the development of human capital in Malaysia. This portion of the chapter will contain data extracted from a few main sources of information. The data that we present will show the trends of human capital in Malaysia. Comparisons will be made with other developed and developing countries to show the status of Malaysia in terms of its accumulation of human capital.

Chapter 3 will contain the theoretical issues and the econometric models that can and have been used to examine the role and contribution of human capital to economic growth. Firstly, at the macro level, we will discuss the development of the growth equations incorporating the human capital factor. The macro models to be discussed include the much-used Cobb-Douglas production function and the endogenous growth theory model derived in the 1990s.

This chapter will also look into the contribution of the human capital factor, namely education and training and its impact at the micro level, i.e. to the individual and to the firm. The role of human capital at this level will be explained by looking at the methods used to measure the rate of returns to education and training for the individual and the firm. Various issues surrounding both the macro and micro level methods will be discussed in this chapter.

Chapter 4 will contain a non-exhaustive set of the existing evidence on education and training conducted at the macro and micro level. This section will constitute the first part of chapter 4. The second part of chapter 4 will review the existing literature on education and training in Malaysia. We will confine the research evidence for Malaysia to within the area of economics in education, i.e. the rate of returns to education and training studies, which indicates the impact of education and training on an individual or firm. We will find that the studies containing the rate of returns to education and training analysis in Malaysia are, firstly, rather limited when the issue of training is considered. Secondly, the available rate of returns to education studies is outdated, given that the latest study was done in 1992. Thirdly, the analyses are mainly confined to a certain group of the population, hence raising the argument that the available results are not representative of the Malaysian population.

Chapter 5's objectives are motivated by the findings in Chapter 4. Chapter 5 will look into an analysis of data collected by the two existing Malaysian Family Life Surveys of 1976-1977 and 1988-1989. These two data sets are the only micro data sets that are available publicly. They contain information on the training experience of a group of Malaysians. By using the human capital earnings function methodology, this chapter is an attempt to calculate the rate of returns to education and training for 2 samples of women found in the Malaysian Family Life Surveys. The more original finding in this chapter will be focused on the gross rate of returns to training and the determinants of training. The results in this chapter will document the first Malaysian indication of the gross rate of returns to training for two groups of women during Malaysia's intermediate stage of development. This chapter will also contain the first set of determinants of training (at the individual level) in Malaysia.

Chapter 6 will contain another empirical study on the rate of returns to education for 1997. By 1997, Malaysia had established itself as a second generation Newly Industrialised Country (NIC). The findings in this chapter will provide the updated rates of returns to education for Malaysia. We will also be able to use the results in this chapter to confirm the findings of higher rates of returns to higher levels of education found in previous studies, which we will review in Chapter 4.

In chapter 7, we will use a collection of 6 datasets to obtain a record of the rates of returns to education in Malaysia. These estimates will allow us to analyse the trends and patterns of the returns to the different levels of education over time. We will observe the change in the marginal gross returns to the different levels of education over a period of six years, i.e. 1984, 1987, 1989, 1992, 1995 and 1997. It is in this chapter that we will use the results of the determinants of female labour force participation to analyse the impact of self-selection on our estimated marginal gross returns to education in Malaysia. We will attempt to link a simple demand and supply of human capital framework to the returns to education results in this chapter.

Chapter 8 will be devoted to the discussion of the impact and usage of our empirical results displayed in Chapter 5, 6 and 7 of this thesis. In this chapter, we will also make an attempt to utilise the political economy model derived by Ashton et al. (1999) to examine the feasibility and possibility of using the rate of returns to education and training analyses result as part of the Malaysian skill formation framework. Chapter 9 will conclude and summarise the findings of the thesis and review the areas for further research.

CHAPTER 2

MALAYSIA'S ECONOMIC DEVELOPMENT AND HUMAN CAPITAL DEVELOPMENT

2.1 INTRODUCTION

This chapter will provide an overview of the different stages of economic development in Malaysia and in the second part of this chapter, we will look specifically at the human capital development in Malaysia. An appreciation of the human capital development and the parallel development of the economy will serve as a useful background to the main theme of this thesis.

We will divide our discussion on the development of the economy into three time periods of 1957 to 1970, 1971 to 1990 and 1991 to 2000. These three periods have been selected based on our viewpoint of the overall development of economic policies in Malaysia. The 1957 to 1970 period is the post-independence and pre-NEP (New Economic Policy) period. We term it as such because this is a period where the structure of the economy was built onto the foundation laid in the period prior to independence from the British. An event in 1969 brought about the New Economic Policy (NEP) in 1970 leading us to the NEP period of 1971 to 1990. This was a period whereby action was taken to achieve a level of stability and peace after a short burst of political and society upheaval. Priority was given to balancing the economy to accommodate and reconcile the differences between the three different ethnic groups in Malaysia. Having achieved a level of stability in the interaction of its people and the economy via the NEP, Malaysia moved on to the National Development Plan (NDP) period. This NDP period, 1991 to 2000 can be said to be the foundation in leading Malaysia towards becoming a more industrialised country by the year 2020 with the launch of Vision 2020[8] in 1990.

Each period is governed by various medium term development plans. For ease of reference, we will sub-divide our discussion in each period to include the following aspects. We will firstly describe the political and social condition of the country followed by the macroeconomic conditions in Malaysia for the chosen time period. The macroeconomic conditions will include a brief presentation of the economic growth rates, savings, investments and inflation. Thirdly, we will look into the contributing sectors during our selected time period and observe how these sectoral trends affected the labour market and trade. Fourthly, we would like to look into some of the main policies that have guided the development and growth of the Malaysian economy for each of our chosen time period. Finally, we cannot ignore the relationship between education and training and the pace and form of economic development in Malaysia. This relationship is the driving force of our thesis. Therefore, we will also look at the development of the education and training sector within each phase of development in Malaysia.

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[8] Vision 2020 details the vision of the current Prime Minister, Dato Dr. Mahathir Mohammed with the ultimate objective of Malaysia being a fully developed country by the year 2020. In order to achieve this vision in economic terms, Malaysia would need to grow by an average of about 7 percent in real terms annually over the 30 years beginning from 1990 to 2020.

The second part of this chapter will cover details on the human capital achievement in Malaysia. Comparisons will be made with other developed and developing countries to show the status of Malaysia in terms of its accumulation of human capital.

2.2 ECONOMIC DEVELOPMENT OF MALAYSIA

Before we embark into our discussion of the Malaysian economy, it would be useful to note that the population in Malaysia is divided into three major ethnic groups, a legacy inherited from the British. They are the Malays, the Chinese and the Indians, the latter two being immigrants to Malaya (Malaysia[9] in the colonial times) from China and India respectively.

Each of the ethnic groups has distinctive characteristics, developed during the colonial days of British rule. The Malays who were considered the "Bumiputra" or the sons of soil are stereotyped to work mainly in the agricultural sector of the country. The Chinese, encouraged by the growing opportunities in estates, urban commerce and small-scale industries were mainly tin miners and lived in the urban areas. Hundreds of thousands of workers from South India were brought in to Malaysia by the British during the early decades of the twentieth century to work on the rubber plantations (Young, et. al, 1980).

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[9] Malaysia was formed in 1963. Before Malaysia was formed, the country was known as the Federation of Malaya. Singapore was excluded from the formation of Malaysia.

The first elections were held in Malaya in 1955. This election brought about the forming of a government under the political flag of the *Barisan National* (National Front party). The *Barisan National* is a coalition of three different political parties, each representing the different racial groups in Malaysia. This coalition party has been in the Government seat for 47 years.

2.2.1 Pre-NEP period, 1957-1970

Political and Social Condition.

In the pre-NEP period, 2 Malaya plans and one Malaysia Plan dictated the development aims of the country. They were the First Malaya Plan, 1955-1960, the Second Malaya Plan, 1956-1965 and the First Malaysia Plan, 1966-1970. On the 31st of August 1957, Malaysia with its multi-racial and cultural society obtained its independence from the British.

When the three party coalition Government took the reigns of the running of the Federation of Malaya, there were three main economic conditions, which had to be looked into. The three main issues were 1) there was a lack of financing for development, 2) a lack of skilled personnel and 3) a condition where there was a rising population growth rate of approximately 3 percent per annum. There was also the arduous task of integrating the new Malaysia (when it was formed in 1963 after the Federation of Malaya). This was a major challenge for the Government, as it had to cater to the different communities, religion and languages of the people of Malaysia. In addition to this, there was a possible confrontation with Indonesia over the area of commerce and fishing in the Borneo States. All these problems (especially the three main economic issues) prevailed during the entire pre-NEP period.

Macroeconomic Condition.

On the macroeconomic front, amidst the problems faced by the country, the Federation was able to attain an average GDP growth rate of 6 percent for the period 1966 to 1970. Inflation appeared to be well controlled at 0.93 percent for the period of 1961 to 1970. Savings were relatively high at 24 percent of GDP considering that the country was at the rebuilding stage. Investment was at 19 percent of GDP during the period of 1960 to 1970. Investments were concentrated on infrastructure expansion. According to Johns (1973), expenditure on infrastructure was relatively large. Roads, railways, ports, electricity and water had absorbed 39.8 percent of total public outlays for development purposes.

Sectoral Trends.

The primary sector of rubber and tin was very much in dominance in the Federation at this stage. The Federation of Malaya was the world's largest producer of natural rubber and in 1960, it accounted for 35 percent of the world's total (Wharton, 1963). In 1960, there were about 2,300 estates and 292,300 smallholdings growing rubber in the Federation.

Rubber was the most important commodity to the Federation as it was: -

- The largest single crop by acreage (3.8 million acres out of 5.5 million or 68 percent).
- The largest source of employment for about half the persons engaged in agriculture (614,487 persons out of 1,244,794 were engaged in agriculture) and almost 30 percent of the economically active population.
- The largest export item, accounting for 63 percent of the total value of Malaya's export.
- The largest source of Federal revenue (about 18 percent) and largest source of export revenue (about 74 percent).
- The largest single item in gross domestic product by industrial origin (26 percent in 1960).

Other crops during this period included oil palm, which was only developed into a major crop in the late 1950s, even though it had existed as a commercial crop in 1922, and paddy, the subsistence crop in Malaya. As we track down the historical road of Malaya, we will find that industrialisation in Malaya was fairly insignificant.

It was in 1955 that the International Bank of Reconstruction and Development (IBRD) produced a report, which had emphasised that there was a need for further expansion in industrialisation in the Federation. The reasons given to support an expansion of industrialisation were to accommodate the high population growth[10] in Malaya and for the purpose of diversification. Resource based manufacturing such as the general expansion of woodworking, pineapple canning, fish processing and other light manufacturing such as household fitting, modern weaving, knitting and garment making factories were recommended.

The sectoral trends were also depicted in the pattern of employment within this period. As noted in Table 2.1, the percentage of economically active people was the highest in the agriculture sector followed by the service sector and the manufacturing sector.

Table 2.1: Employees by Gender in Agriculture, Manufacturing and Services (Percentage of economically active people), 1960-1970

Year	Agriculture		Manufacturing		Services	
	Female	Male	Female	Male	Female	Male
1960	80.5	56.7	5.8	13.9	13.8	29.4
1970	66.4	48.0	9.9	16.3	23.7	35.7

Source: World Bank Development Indicators on CD-ROM, 2000.

Given the activities in the primary sector, rubber, tin and timber were the top three primary products contributing to the exports of the country (Munro, 1973).

[10] The Federation of Malaya faced a population growth rate of 3.3 percent per annum.

Economic Policy Orientation.

Following the call from the IBRD for industrialisation, the Pioneer Industry Ordinance (PIO) was introduced in 1958 and it became the first national industrial policy in the economy. Infrastructure development, provision of industrial estate facilities and efforts to encourage local entrepreneurship recommended by the IBRD were also undertaken. The PIO was the starting point of import substitution policies in Malaysia (Rasiah, 1995). Import substituting of manufactured goods was recommended in anticipation of a foreign exchange gap which if occurred could affect the growth targets set for investment and GNP growth (Johns, 1973).

Ten years later, in 1968 the Government initiated export-oriented industrialisation into the country via the introduction of the Investment Incentive (II) Act. This Investment Act offered tariffs and tax exemptions for a period of between 5 to 10 years to export-oriented firms (Rasiah, 1995). This indicated a changeover from an ISI trade policy to the EO orientated trade policy. We will discuss how this switch from the ISI trade policy to the EO policy came about in the next main section detailing the economic development during the NEP period.

Education and Training Policy Orientation.

On the education front, throughout this period (1957-1970), education was recognised as an essential provision within the social aspect of the country. There was a pressing need to integrate the three races in Malaysia and education was seen as one of the integrating tools. By the late 1950s, an educational system was set up to cater to the growing population of Malaya.

The government elected in the 1955 elections established the first education committee to look into the education system. This committee, the Razak committee (named after the education minister at that time) established in 1956 was responsible for integrating a fragmented colonial education system. The mandate on this committee as noted by Rudner (1994) was: -

> "Establishing a national system of education acceptable to the people of the Federation as a whole which will satisfy their needs and promote their cultural, social, economic and political development as a nation, having regard to the intention of making Malay the national language of the country whilst preserving and sustaining the growth of the language and culture of other communities."
>
> Rudner, 1994

The recommendations from this committee led to the forming of the current education system in Malaysia, where the main medium of instruction is the national language, the Malay language. The appendix contains a chart of the Malaysian education system. This education system calls for 6 years of primary education, 3 years of lower secondary education and 2 years of upper secondary education. The post secondary education involves 2 years in pre-university preparation, which would lead one to a 4-year local university education.[11]

In 1961, primary school fees were abolished and the school leaving age was raised to the age of 15 (which encompasses education till Form 3, the end of the lower secondary schooling phase). At this stage, which covered the First Malaysian Plan, 1961-1965, secondary school facilities continued to expand and by the end of this plan, there were 3 local universities in total.

However, it was also during this period that prioritising was essential given the unsettled economic and social structure of the country. Due to this, we will find that at one point in time of this development period, the emphasis given to the education sector faltered to give way to other more important issues in the country. According to Lee et al. (1985),

> "The (First Malaya) Plan states that it could not meet the estimates required for education simply because to do so would involve cuts in other sectors. As stated earlier, the Plan also states that the ability of the Government to fulfil education's demands would be contingent upon the price of natural rubber staying above an acceptable level."
>
> Lee, et al, 1985

[11] There are alternative routes as quotas are in place in local universities. For those who are unable to enter the local universities, the alternative route involves registering into a private university or college to pursue a university degree (These are the 3+0 programmes, which became widely known after and during the financial crisis in 1997) or a twining programme, where the person will spend 1 to 2 years in Malaysia with the final year or final two years spent in a university overseas.

The statement above revealed that although the Malayan Government recognised the importance and the economic and social benefits that could have been reaped from providing adequate education to its citizen, it was forced to sacrifice some of the benefits due to the lack of funds. The future of the education and training sector was dependent on the outcome of the main primary sector product, rubber.

Summary of the Pre-NEP period, 1957-1970.

Table 2.2: Summarising the Pre-NEP period, 1957-1970

	Condition
Political and Social	Unstable.
Sectoral Trend	The economy was very reliant on the primary sector, especially on the success of Rubber. Manufacturing was initiated as a form of diversification for the economy.
Economic Policy Orientation	Starting point of industrialisation and import substitution orientated polices. This ISI policy was later converted to the EO promoting policy.
Education and Training Policy Orientation	Used as a social tool to integrate the three races in the country. However, it was granted a fairly low level of priority given the condition of the economy.

Due to the unstable political and social condition within the country, an unprecedented racial riot took place in 1969. The racial riots arose due to a mix of political and socio-economic deteriorating conditions, which were interpreted and seen primarily in ethnic terms whereby the Malays believed that Chinese economic powers were responsible for the Malay economic backwardness. When this racial riot occurred, the coalition Government was forced to acknowledge that there were serious imbalance and instability in the country. The need for a solution to this imbalance brought about the launching of the New Economic Policy (NEP) in 1970. This leads us to our next phase of development, the NEP period of 1971 to 1990.

2.2.2 The New Economic Policy (NEP) Period, 1971-1990.

Political and Social Condition.

As noted in our summary of the pre-NEP period, the New Economic Policy (NEP) was launched in 1970 to rectify imbalances within the economy. The NEP marked a period of long-term planning based on the two-prong approach of eradicating poverty irrespective of race and the restructuring of the Malaysian society to reduce and eventually eliminate the identification of race according to their economic functions.

The aim of the NEP was to get the nation to participate in the progress of social change and to create a viable and dynamic commercial and industrial community of the Malays and other indigenous people. The latter was motivated by the fact that the Malays were the poorest among the three races in Malaysia and that they were concentrated in the rural areas while the Chinese dominated the urban occupations of commercial and industry. To achieve the aim of creating a viable and dynamic commercial and industrial community of Malays, it was declared that the Bumiputra ethnic group must undertake 30 percent of stockholding or equity in businesses.

The NEP became a development plan for the next 20 years and is the main point of reference for future development plans in Malaysia. Four medium term development plans formed the entire NEP period. They were the Second Malaysia Plan, 1971-1975, the Third Malaysia Plan, 1976-1980, the Fourth Malaysia Plan, 1981-1985 and the Fifth Malaysia Plan 1986-1990. Throughout this period, there was no undesired major breakout of social and political unrest.

Macroeconomic Conditions.

Average GDP growth for the whole NEP period was 7 percent. The percentage of investments as a percentage of GDP exceeded savings (28 percent of savings as a percentage of GDP and 32 percent of investments as a percentage of GDP). In the 1980s, Foreign Direct Investments (FDI) that was assembly type and labour intensive were promoted. By allowing FDI flows, Malaysia had hoped to be able to reap the benefits such as technology transfers, management expertise, employment creation, new product development, trade generation and access to new markets, besides being an important source of capital.

The Malaysian Industrial Development Authority estimated that foreign equity as a percent of total equity in approved manufacturing projects increased from 17.8 percent in 1985 to 49.1 percent in 1987. In 1990, the foreign percentage share further increased to

61 percent. Inflation was 4.5 percent on average for the entire NEP period, 1971-1990. Malaysia experienced a short recession period from 1985 to 1986.

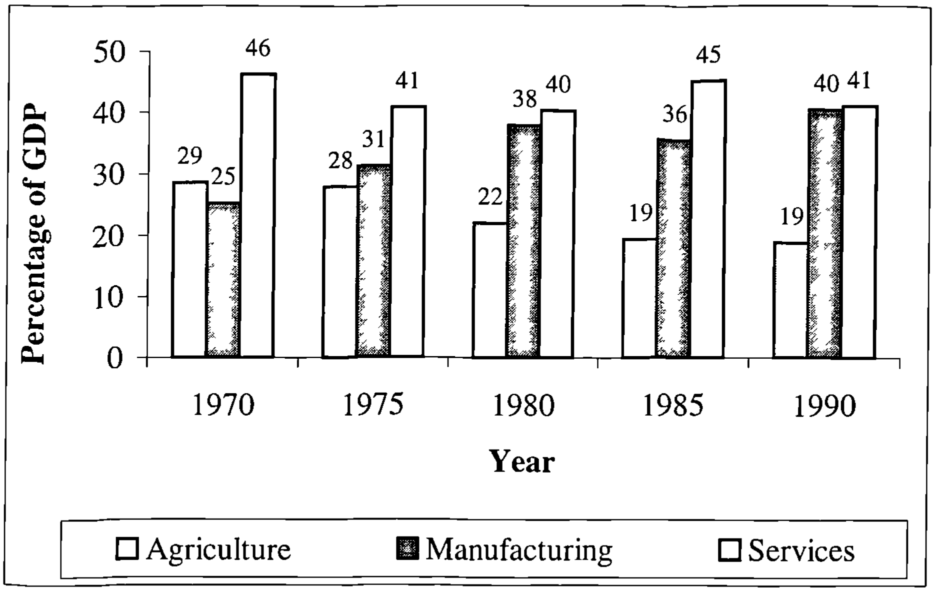
Sectoral Trends.

In the general economy, the agriculture sector in the 1970s was contributing a fair amount to GDP. The value-added contribution of the agriculture sector towards GDP was hovering around the 20-percentage point mark in 1970 to 1990. It was only by the mid-1970s, that the value-added contribution of the industrial sector (which includes mining, manufacturing, construction, electricity, water and gas) towards GDP was higher than the contribution from agriculture (as seen in Graph 2.1).

Heavy industrialisation began in 1980. Focus was given to heavy industries such as steel and the national car project. Heavy industries were implemented with the aim of facilitating economic linkages, technology diffusion and broadening of the industrial sector.

The pattern of employment followed the change in the sectoral contribution of the economy. Share of employment in agriculture had decreased in 1970 to 1980 while the share of employment in industry had increased. Using data segregated by gender (as displayed in Table 2.3), we find that in 1970, 66 percent of female employees in the agriculture sector decreased to 49 percent in 1980 and 26 percent in 1990. Male employees in the agriculture sector decreased from 48 percent in 1960 to 36.4 percent in 1980 and 28 percent in 1990. In the industry sector, female employment increased from 10 percent in 1960 to 18 percent in 1980 and 23 percent in 1990. The male employment increased from 16 percent in 1970 to 19 percent in 1980 and 23 percent in 1990.

Graph 2.1: Sectoral Contribution (Percentage of GDP), 1970-1990



Source: World Bank Development Indicators on CD-ROM, 2000.

Table 2.3: Employees by Gender in Agriculture, Manufacturing and Services (Percentage of economically active people), 1970-1990

Year	Agriculture		Manufacturing		Services	
	Female	Male	Female	Male	Female	Male
1970	66.4	48.0	9.9	16.3	23.7	35.7
1980	49.3	36.4	17.7	19.3	33.0	44.3
1990	25.6	28.3	22.7	23.4	51.8	48.3

Source: World Bank Development Indicators on CD-ROM, 2000.

The employment structure was not only influenced by the sectoral trends during this period. The NEP had its influence on the employment structure via its requirements on the equity holding of any business in Malaysia. As such, the employment-restructuring policy implemented under the NEP came in the form of Government interventions in the labour market with a view to increase the Bumiputra employment share to about 50 percent in manufacturing and other sectors so as to reflect the ethnic composition of the population (Onozawa, 1991).

Due to the boom in the economy in the early 1980s, Malaysia faced a shortage in its labour market and there were high incidents of job-hopping and staff pinching among employees and employers of firms, in addition to upward pressure on wages. However, when Malaysia went into a period of economic recession in 1985-1986, unemployment rates were recorded at 8.2 percent. Then, in 1987 to 1989, due to buoyant economic activities and expansion in the manufacturing sector, demand for labour improved and the high unemployment rates in 1985-1986 improved to 7.1 percent in 1987-1989.

The contribution of rubber and tin exports declined and like employment and overall sectoral trends, exporting of manufactured goods dominated. Within these manufactured goods, electric, electronic and machinery were the main exports. It contributed to more than 50 percent of total exports of manufacturing goods (Malaysia, 1998a).

Economic Policy Orientation.

In 1984, the Government implemented the National Agriculture policy (NAP) to revitalise the weakened agriculture sector. Modernisation and revitalisation were the main theme of the NAP, which according to the Fifth Malaysia plan, 1981-1985 had provided guidelines on the strategy for land development of specific commodities.

In 1986, the first Industrial Master Plan, 1986-95 was implemented and it was intended to provide a blueprint for an accelerated industrial development. Also in 1986, the Promotion of Investment Act was introduced to promote manufacturing. This act was induced by the lack of technological issues in the previous investment acts. This act allowed the Government to place more emphasis on exports and technology development (Rasiah, 1995).

The following actions were taken by the Malaysian Government in implementing its employment restructuring policy in accordance with the NEP objectives.

- The Industrial Co-ordination Act ordered in 1975 raised the ruling that manufacturing licences was to be made conditional on the applicant firm's compliance with the Bumiputra employment quota.
- The Ministry of Trade and Industry made Bumiputra employment a condition in providing any approval for such projects as production capacity expansion plans and

- The willingness of foreign companies in Malaysia to promote Bumiputra managerial or professional posts was used as a criterion in granting or rejecting their request for working permits for their expatriate staff.

In the trade market, Malaysia had gone through a phase of combined export promotion and import substitution policies (World Bank, 1993) between 1971 and 1985. Export promotion or export-oriented industrialisation began to take place because import substitution industrialisation (ISI) did not fully assist the Malaysian economy in certain aspects.

The ISI strategy did contribute to the economy by assisting in the diversification of the economy. The ISI strategy had helped reduce the excessive dependence on imported consumer good, utilising some domestic natural resources and created employment opportunities. It had on the overall contributed to economic growth. Unfortunately, the ISI strategy came up against a limited domestic economy.

> "Industrial expansion was initially rapid as the readily available home market was easily captured behind the tariff walls. But the initial impetus to industrial growth soon petered out as the frontiers of the domestic market were reached"
>
> Lim and Toh, 1992.

Three failures of the ISI strategy identified by Lim and Toh (1992) were firstly, failure of the ISI strategy to alleviate Malaysia's balance of payment problems. Balance of payment problems were aggravated when intermediate goods were heavily imported for usage in the production of consumer goods. The ISI's second failure was its inability to reduce unemployment in Malaysia. This was due relatively to the low labour absorptive capacity of the manufacturing sector. Capital-intensive industries were expanding faster than labour intensive ones, hence affecting employment. The third failure was that anticipated spillover of surplus production into the export market did not take place. According to Lim and Toh, this occurred because the import competing industries, nurtured by protection were generally inefficient and were therefore unable to compete in the overseas markets. Due to these failures, the EO policy was adopted.

In 1985, due to the oil crisis, Malaysia began to experience a period of recession. It was during this period that the private sector was given a stronger role. The role of the private sector accelerated when privatisation formally began in 1983. Privatisation began in the manufacturing sector followed by the privatisation of public utilities. We will find that the role of the private sector continued to be enhanced in the next stage of development in Malaysia.

Education and Training Policy Orientation.

Education remained a national building tool with emphasis given on the quality of the education system. During this period, vocational training became an added feature to the educational system and the tertiary education system began to take shape. The National

Advisory Council on industrial training[12] was established during the Second Malaysia Plan period of 1971-1975 with a primary responsibility of bringing about close co-operation and co-ordination between industries and the Government in the field of training.

The Third Malaysia Plan period, 1976-1980 saw the establishing of the National Industrial Training and Trade Certification Board (NITTCB) to set standards and to develop a syllabic to certify skill workers from public and private training institutes. Science and technology was also given emphasis in the Third Malaysia Plan.

In 1979, a committee was formed to examine and investigate the condition of the Malaysian Education system. Recommendations made by the 1979 Committee on Education was used to formulate the education and training plans in the Fourth Malaysia Plan. In this Fourth Malaysia Plan, the idea of extending the nine years of universal schooling to eleven years[13] (to go beyond the lower secondary) was initiated. For this to be possible, free education up to the upper secondary level for children was provided.

In the area of training, Malaysia's Look East policy adopted during the Fourth Malaysia Plan (1981-1985) opened doors for on-the-job training opportunities in various

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[12] This council is under the care of the Ministry of Human Resources.

[13] However, it was only in 1995, that the Government officially revised the concept of basic education in Malaysia from 9 years to 11 years. This revision subsequently led to the allowance of an automatic promotion from Form Three to Form Five in 1997 (Razali, 1999).

institutions in Japan and South Korea for Malaysians. In addition, skilled workers were also attached to Japanese and South Korean firms in the country to enable them to learn and acquire the discipline and work ethics practised by the Japanese and South Koreans.

It was also during this NEP period (more specifically, in the Fifth Malaysia Plan, 1986-1990) that a second role of education and training was highlighted. In the Fifth Malaysia Plan, the education and training sector was to produce a group of disciplined, diligent, motivated, knowledgeable, trained and skilled Malaysians to push the country into further development.

Summary of the NEP period, 1971-1990.

At the end of the NEP period, although not all the targets of the NEP were met, it was still considered as a success as the NEP was able to help Malaysia resolve its ethnic differences and this can be seen from the country's performance in terms of its economic growth and development. The partial success of the NEP is the base to the continued economic progress throughout the 1990s.

Table 2.4: Summarising the NEP period, 1971-1990

	Condition
Political and Social	Level of stability increased with the NEP. The Social restructuring of the NEP was successful to a certain extend. Although targets were not fully met, to be able to push the Bumiputra share of stockholding from 2.4 in 1970 to more than 10 percent in 1990 was an achievement in itself. There was a reduction in income distribution inequality. The Gini Coefficient fell from 0.513 in 1970 to 0.445 in 1990.
Sectoral Trend	Manufacturing shares in GDP contribution, employment and export increased, exceeding that of agriculture.
Economic Policy Orientation	Policies were concentrated on Industrialisation and employment restructuring as advocated by the NEP. The private sector was given recognition during this period.
Education and Training Policy Orientation	Continued as a social tool. The second role of the education and training sector was introduced. Vocational training and on-the-job training was given a new light of emphasis. Importance of this sector increased.

The changing sectoral trend led to the various changes in the policies implemented by the Government. These changes were supported by an increased stability in the country's political and social condition. During this period of development, the private sector's role was given recognition. It was also during this period that the education and training sector was given a second function in the economic development of the country. The next development period of 1991-2000 under the umbrella of the National Development Policy (NDP) reflects these changes.

2.2.3 Post-NEP – The National Development Policy (NDP), 1991-2000

Political and Social Conditions.

During this period of 1991-2000, the political and social condition had changed remarkably by the NEP. By the end of 1990, Malaysia can be said to be politically and socially stable.

The National Development Policy (NDP) replaced the NEP after it ended in 1990. The National Development Policy of the 1990s emphasised on human resource development and science and technology. The private sector became the engine of growth. The move to increase the role of the private sector saw Government deficits being reduced drastically at the end of the 1980s (-6.1 percent of GDP in 1987 to –0.4 percent of GDP in 1992). Government surpluses were obtained from 1993 onwards till 1996. Two medium term plans dictated the development plans in this period. They were the Sixth Malaysia Plan, 1991-1995 and the Seventh Malaysia Plan, 1996-2000.

In 1990, Vision 2020 was launched and this marked the starting point for a vigorous move towards becoming a developed country by 2020 via industrialisation. Vision 2020 details nine challenges[14] for the Malaysian population. The challenges presented in this Vision aims to develop Malaysia using a "unique" mould and the development of the

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[14] The full nine challenges can be seen at http://www.jaring.my/isis/mbc/2020.htm.

country must cover all dimensions, i.e. economically, politically, socially, spiritually, psychologically and culturally.

Macroeconomic Conditions.

Economic growth in Malaysia at the start of this period was 9.6 percent in 1991 after having gone through 2 oil crises and a recession in 1985. Savings and investments were almost equal in this period (37 percent savings and 38 percent investments as a percentage of GDP for the period 1991-1996). It was also during this period that Malaysia had gone through a crisis together with some of its neighbouring Southeast Asian countries. The crisis began in 1997 and this crisis had pushed GDP growth down to –7.5 percent in 1998. The economy recovered at a slow pace by achieving a real GDP growth rate of 5.8 percent in 1999 and estimated real GDP growth for the year 2000 is 7.5 percent (Malaysia, 2000).

In terms of investment, foreign investments in the manufacturing sector were higher than domestic investments between 1990-1992. To encourage domestic investments, the Government launched the Domestic Investment Initiative in 1993. This programme appeared successful when domestic investments in 1993 exceeded foreign investments by 19 percent. During the early years of the 1990s, the main source of FDI came from Japan, Taiwan, USA, France and Singapore.

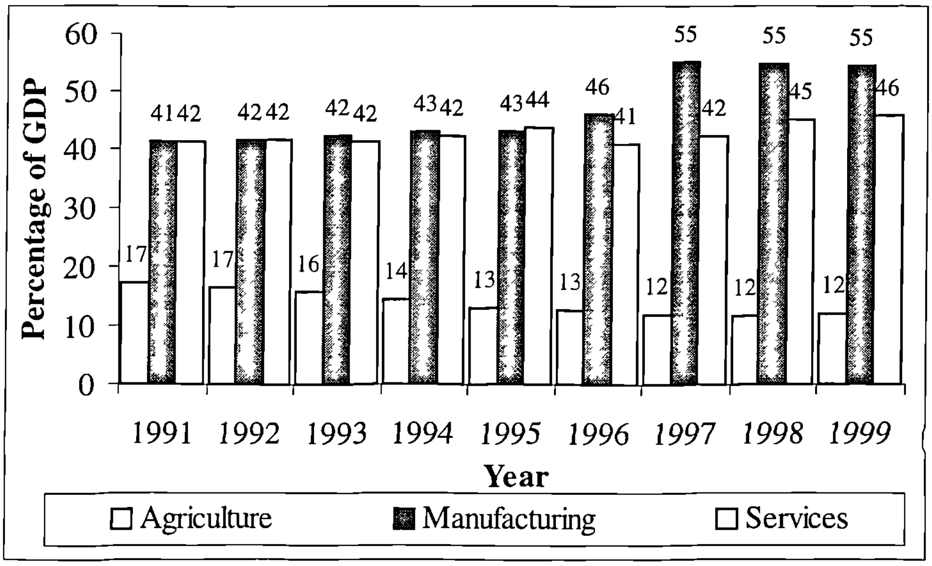
Investments in manufacturing were positive till 1998 where investments declined due to the cautious attitude of both the foreign and local investors. During the Seventh Malaysia Plan review period of 1996-1998, more than half of the total investments approved were from domestic investors while the remaining 48.1 percent were FDIs. FDIs for the latter half of the 1990s came from Japan, USA, Singapore, Taiwan and Switzerland. The main industries, which received the FDI contributions, were of high technology, capital-intensive and information technology related investments.

Inflation was relatively stable at 4.5 percent for the period before the crisis, 1991-1996. Yearly inflation rose from 2.7 percent in 1997 to 5.3 percent in 1998 (Malaysia, 1999a). The inflation rate for 1999 was 2.8 percent and is estimated to be at 1.8 percent for the year 2000 (Malaysia, 2000). Full employment was achieved in 1993 with unemployment rate at 3 percent. Unemployment rates fell from 5.1 percent in 1990 to 2.5 percent in 1997. During the crisis, the unemployment rate for the year 1998 did not appear to have risen drastically. The Government reported an unemployment rate of 3.2 percent for 1998 and the unemployment rate for 1999 was at 3 percent and is estimated at 2.9 percent for the year 2000 (Malaysia, 2000).

Sectoral Trends.

The agriculture sector's value added contribution in this decade continued to decrease from 18 percent of GDP in 1990 to 12 percent of GDP in 1999 while manufacturing's value added contribution to GDP increased from 41 percent of GDP in 1990 to 55 percent of GDP in 1999 (as displayed in Graph 2.2).

Graph 2.2: Sectoral Contribution (Percentage of GDP), 1991-1999



Source: World Bank Development Indicators on CD-ROM, 2000 and Economic Report 1998/99.

In 1997, due to the effects of the financial crisis, the agriculture sector recorded a growth of only 0.4 percent from 1996, with a negative growth of –4.5 percent in 1998. The estimated growth for the agriculture sector in 1999 was 4.6 percent. The manufacturing sector's growth fell by 8 percent from 1996 to 1997 (18.2 percent growth in 1996 to 10.4 percent growth in 1997). In 1998, the manufacturing sector growth was a –13.7 percent and in 1999, it was estimated to have achieved a growth rate of 8.9 percent.

Employment wise, strong demand for labour came from the manufacturing sector as compared to the agriculture sector with the service sector employing the larger proportion of employees from 1992 to 1998 (as displayed in Table 2.5 below).

Table 2.5: Employees by Industries (Percentage of total employment), 1992-1998

Year	Agriculture	Industry	Services
1992	24.5	30.8	46.9
1993	22.4	31.0	46.0
1994	19.4	33.3	46.5
1995	19.0	35.0	46.0
1996	17.7	35.9	45.9
1997	16.7	36.9	46.0
1998	16.3	35.9	47.3
1999	15.9	36.4	47.2
2000 (forecast)	15.4	36.8	47.3

Source: Economic Report 2000/2001 (Volume 29)

Employment by sector (except the service sector) decreased throughout the crisis period. In 1997, the growth of employment in the agriculture sector was –1.6 percent, becoming worst in 1998 with a –4.6 growth (Malaysia, 2000). In 1999, the agriculture sector's employment growth was estimated at –0.1 percent. The manufacturing sector had also displayed poor figures of yearly employment growth since the crisis in 1997. In 1997, employment growth in this sector was recorded at 7.4 percent and had faced a negative growth of –5.0 in 1998. Estimated growth in employment in the manufacturing sector was 3.1 percent in 2000.

The main contributing sector in exports remained with the manufacturing sector. The electrical and electronic, textile and wood products industry continued to be the leading sub-sector. Imports were concentrated on intermediate goods, followed by capital goods and consumption goods.

The merchandise or the goods accounts were in surplus most of the time but due to the poor performance of the service account in the balance of payment, Malaysia faced very high current account deficits in the 1990s. There were years where the current account deficits were more than 5 percent of GDP, for example, in 1992 and 1995, current account deficits were more than 8 percent of GDP. The current account deficit at levels above 5 percent was one of the factors deemed to have led to the crisis in 1997. In 1998 and in 1999, surpluses were recorded, as the positive goods account balance was able to cover the deficits in the services account balance.

Economic Policy Orientation.

The industrialisation policy of the 1990s emphasised export-led growth through industrial diversification, provision of a liberal investment climate and the promotion of intra-industry linkages.

Part of the industrialisation in Malaysia involved small and medium industries (SMIs). In Malaysia, a small-scale industry refers to a manufacturing establishment with a paid-up capital of less than RM500,000 and the employment of between 5 and 50 full-time workers. A medium-scale industry is a manufacturing establishment with a paid-up capital of between 500,000 and less than RM2.5 million and employing between 51 and 75 full time workers. A survey conducted by the Government in 1992 revealed that 84 percent of the total manufacturing establishments were SMIs. However, they were only contributing to about 28 percent to total value-added and 33 percent to employment, constricted by the size of the SMIs. The majority of the SMIs were concentrated in food, beverages and tobacco, fabricated metal products, machinery and equipment, wood products, textile and wearing apparel as well as the leather industries.

To forge linkages between the larger industries and the SMIs, the Government launched various programmes such as the vendor development programme. By 1992, the growth targets set by the First industrial Master plan[15] (IMP) were achieved. For example, in the First IMP, an average growth rate of 11 percent was set for the electronics and electrical sector. By 1992, this sector had already achieved an average annual growth rate of 30.5 percent. With this success, the Second Industrial Master plan, 1996-2005 was implemented. This Second Industrial Master Plan builds upon the success of it

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[15] The First Industrial Master Plan was launched in 1986 and was a guideline for the industrial sector for the period 1986-1995.

predecessor, the First IMP (Kim, 1997). The Second IMP contains an integrated industry-wide vision plan for the industry, embracing both manufacturing and business support services.

Education and Training Policy Orientation.

We believe that it was during this period of development that the second objective of the education and training sector had subtly taken over the nation-building objective. Human Resource Development was given a new definition in the National Development Policy. The Malaysian human resource development for this period was linked to competitiveness, technology, productivity and innovativeness. These elements gave a new dimension to the Malaysian education and training sector. Tertiary education was given emphasis during this development period. Two new universities were established and were both located in East Malaysia, University Malaysia Sarawak (UNIMAS) in Sarawak and University Malaysia Sabah (UMS) in Sabah.

The private sector became more involved in the education sector[16] during this period and the term skills became more prevalent. For example, one of the two human resource development aspect under the NDP covered the creation of a productive and disciplined

[16] In the early 1990s, privatisation expanded to cover the financial sector. The education and training sector was the next sector to be liberalised.

labour force in addition to developing the necessary skills to meet the challenges in industrial development through a culture of merit and excellence.

A skill development Fund, the Human Resource Development Fund was launched in 1992. This fund was designed to encourage participation from the private sector in increasing the incidence of training and improving training in Malaysia. The Government wanted the private sector to bear a greater responsibility in training skilled workers for the development of the Malaysian economy.

To meet the needs for higher skilled manpower in new skill areas at the higher level, advanced skill-training institutes were established. This was done via co-operation with institutions in Germany and France. In 1992, the German-Malaysian Institute was established offering advanced skill training, particularly in production technology and industrial electronics. Three years later, in 1995, the Malaysia-France Institute offered courses at the advanced level in areas such as maintenance of automated mechanical system and machine, electrical equipment installation and welding technology.

Information technology seeped into Malaysia's economic sectors including the education and training policy in the Sixth Malaysia Plan. Within the period of the Sixth Malaysia Plan, a computer literacy programme was launched with the objective of exposing students to basic knowledge in computer literacy. The teachers were also exposed to computers and in 1994, computer courses were made compulsory for all trainees in teacher training colleges.

The Seventh Malaysia Plan, 1996-2000 documented the final phase of the National Development Plans. This plan continued to formulate the increasing role of the private sector as the engine of growth. The Government continued its role as a facilitator of education by expanding the physical facilities that were available.

For instance, the main focus of primary education in the Seventh Malaysia Plan period was to expand school facilities, particularly in rural areas, and to develop a strong foundation in Mathematics, Science and English as well as good ethics and discipline among school children. Similar efforts were carried out at the secondary level. The Seventh Plan designed the continuous progression of students from Standard one to Form five. This action increased compulsory education in Malaysia from 9 years to 11 years.

The emphasis and priority in producing a group of students excelling in Mathematics and Science was also implemented among secondary technical education and at the teacher training level as well. The Government was also determined to place more emphasis on tertiary education. Its aims for this level of schooling were: -

- To increase capacity to meet the growing local demand for higher education as well as developing higher education as an export industry.

- Improve the quality and relevance of courses offered so as to match national manpower requirements.
- To increase the enrolment of first-degree level among those aged 19 to 24 in the local public institutions from 3.5 percent in 1995 to 15.6 percent in the year 2000.
- To increase the capacity of enrolment in the Science, Engineering and Technical related courses so as to intensify the production of manpower with Science and Technical knowledge.
- To increase the capacity for postgraduate courses from 11.5 percent of total enrolment at the degree level in 1995 to at least 14 percent in the year 2000.
- Increasing the capacity and capability to undertake research and development (R&D) in the industrial and service sectors and
- To increase private sector participation, which will supplement the Government's efforts in expanding tertiary education opportunities. By doing so would help the Government reduce the growing public expenditure on education.

Acting in line with the aims of the Seventh Malaysian Plan for greater private sector involvement, legal aspects pertaining to education were revised. Six new laws were implemented to allow for more participation from the private sector. The implementation of this new legislation was in line with Malaysia's plan to become a regional hub for tertiary education. The first foreign university to set foot in Malaysia was a branch campus belonging to the University of Nottingham, a joint venture between the

University of Nottingham and two private companies, Boustead Holdings Berhad and YTL Corporation Berhad (Star Online, 1999).[17]

At the end of the Seventh Malaysia Plan, six private universities were set up. They were Universiti Multimedia, Universiti Tenaga Nasional, Universiti Teknologi Petronas, Universiti Tun Abdul Razak, The International Medical University and the Universiti Industri Selangor. In addition to these locally established private universities, foreign universities present were branch campuses of University of Nottingham and Monash University and Curtin University of Technology from Australia.

The public universities (11 in total) consisted of Universiti Malaya (UM), Universiti Sains Malaysia (USM), Universiti Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM), Universiti Teknologi Malaysia (UTM), Universiti Malaysia Sarawak (UNIMAS), Universiti Malaysia Sabah (UMS), Universiti Pendidikan Sultan Idris (UPSI), Universiti Islam Antarabangsa (UIA), Universiti Teknologi MARA (UiTM). These 11 public universities later formed the Multimedia Technology Enhancement operations (METEOR) in 2001, a distance learning programme to increase the capacity of the public universities.

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[17] The Star Online (1999), "Private Sector needs to take lead again as engine of growth," June 2, 1999.

Summary of the NDP period, 1991-2000.

Table 2.6: Summarising the NDP period, 1991-2000

	Condition
Political and Social	Considerably stable.
Sectoral Trend	The manufacturing sector was the engine of growth.
Economic Policy Orientation	Policies encouraging the private sector's involvement in the economy heightened during this period. Policies emphasising industrialisation to achieve Vision 2020 were formulated and implemented.
Education and Training Policy Orientation	Definition of human resource development was seen in a new light with the launch of Vision 2020. This sector was accorded a higher level of priority in the development of the economy. Participation from the private sector was strongly encouraged. Science and Technology, in addition to Information Technology courses were given emphasis.

2.3 HUMAN CAPITAL DEVELOPMENT IN MALAYSIA

In the above sections, we have attempted to detail the Malaysian economic development over three periods in line with major policy changes including that within the education and training sector. This section is to provide a background of the development of the human capital factor, which is usually depicted via the two elements of education and training in Malaysia. We shall assess the human capital development in Malaysia by looking at four elements, i.e. Government expenditure for the education and training sector, the statistics indicating attainment figures and the human development index produced by the UNDP.

Before going into detail of the various indicators mentioned in the earlier paragraph, it would be appropriate to introduce and briefly discuss the main institutions which are involved in the development of the human capital factor in Malaysia.

One of the two main institutions, which play a role in the forming of the human capital factor, is the Ministry of Education. This ministry is responsible for establishing a national system of education and it plays a role in ensuring that education is provided to all in Malaysia, irrespective of background, religion or ethnicity.

The other ministry, which has a hand in the education and training sector in Malaysia, is the Ministry of Human Resources. This ministry is responsible for the formulation and review of policies and strategies related to labour issues as well as private sector manpower and training needs to ensure that there is optimum utilisation of human resources in Malaysia. Some of the functions of this ministry are to assess and monitor the demand and supply of labour in specific economic sectors and examining the implication of labour demand and supply on wages, training requirements and industrial restructuring efforts.

Another institution, which has a role to play in the development of education and training in Malaysia, is the Human Resources Development Fund Council, which administers and monitors the Human Resources Development Fund (HRDF). This HRDF is an incentive scheme where grants are provided to employers to encourage them to undertake and accelerate systematic training programmes.

The private sector became more involved in the development of human capital in 1995, at the start of the Sixth Malaysian Plan period. The private sector is expected to work within the objectives set by the two ministries discussed above to enhance the development of human capital in Malaysia. These institutions will be featured again in Chapter 8 of this thesis during our utilisation of the developmental state skill formation model by Ashton et.al. (1999).

2.3.1 Government Expenditure on Education and Training.

The Government's role in providing education and training has always been prominent even after the launching of the NDP, 1991-2000 where the private sector's role was expanded to cover education and training. Table 2.6 shows Government expenditure on education and training as a percentage of the total development Government expenditure. The education and training sector received the largest share of development allocation out of the 3 major social service components (i.e. Education, Health and Housing). Government expenditure rose from 7.8 percent of total development expenditure in 1966-1970 to 15.1 percent in 1996-2000.

This large bulk of development expenditure on the education and training sector reflects the commitment of the Government in expanding this sector for the future development of the country.

Table 2.7: Government Expenditure on Education and Training (Percentage Share of Total Development Expenditure)

	Education and Training	Total Development Expenditure (RM Million)
1966-1970	7.8	4,242
1971-1975	6.9	9,821
1976-1980	7.3	21,202
1981-1985	10.1	46,320
1986-1990	16.1	35,300
1991-1995	13.4	54,705
1996-2000	15.1	67,500
2001-2005	20.6*	103,409

Source: Kanapathy (1999), * Eighth Malaysia Plan, 2001-2005.

2.3.2 Human Development Index

The Human Development Index (HDI) derived by the United Nation Development Programme (UNDP) uses three indices to calculate the HDI for a country. The three indices used are the life expectancy index, educational attainment, as measured by a combination of adult literacy and combined first, second and third level gross enrolment ratio and standards of living, as measured by the adjusted per capita income in PPP$ (UNDP, 1999).

Table 2.8 shows the HDI for a combination of developed and developing countries. The number in the bracket indicates the ranking of the country against the 174 countries listed in the UNDP report.

Table 2.8: Human Development Index, 1975-1997

	1975	1980	1985	1990	1997	Rank
Thailand	0.604	0.647	0.678	0.717	0.753	Medium (67)
Malaysia	0.614	0.654	0.691	0.718	0.764	Medium (56)
Singapore	0.737	0.767	0.796	0.834	0.888	High (22)
Japan	0.851	0.875	0.890	0.906	0.924	High (4)
Korea	0.680	0.716	0.761	0.804	0.852	High (30)
Hong Kong	0.757	0.796	0.823	0.859	0.880	High (28)
Indonesia	0.471	0.533	0.586	0.630	0.681	Medium (105)
United States	0.865	0.885	0.897	0.911	0.927	High (3)
United Kingdom	0.840	0.848	0.856	0.876	0.918	High (10)

Source: UNDP (1999)

Malaysia was ranked 56th out of the 174 countries with HDI calculations reported in the Human Development Report 1999 (UNDP, 1999). Malaysia was also categorised under the category of countries with medium human development. Malaysia's HDI has been increasing from 1975 to the latest measure in 1997. The trend of the HDI for Malaysia indicates that there was progress in human development amidst economic development in Malaysia.

2.3.3 *Educational Attainment.*

To look at the educational attainment figures, we use the Barro and Lee (1993, 2001) constructed data set containing educational attainment by level information for 129 countries over a 5-year period. We opt to use this data set as it allows us to make an international comparison of the educational attainment across the different countries that we choose to compare Malaysia with. To construct this data set, Barro and Lee (1993, 2001) used census/survey figures for over 40 percent of the cells while the remaining cells were estimated using school-enrolment data by a perpetual inventory method.

The lack of proper educational data and the limitations of data sets, which were already available, had motivated the construction of the Barro and Lee educational attainment data set. According to Barro and Lee, school enrolment ratios and literacy rates (which have been used in some existing empirical studies) do not provide a true picture of the stock of human capital that is available in the country. Enrolment ratios are only able to show the current flow of education and it's the accumulation of these flows, which will allow the stock of human capital to be ascertained. Adult literacy rates, on the other hand, do not reflect skills that are obtained beyond the most elementary levels of schooling (Barro and Lee, 1993). Barro and Lee (2001) updated their 1993 data set in 2001. In the update, figures for the year 1995 were calculated along with the projection for the year 2000.

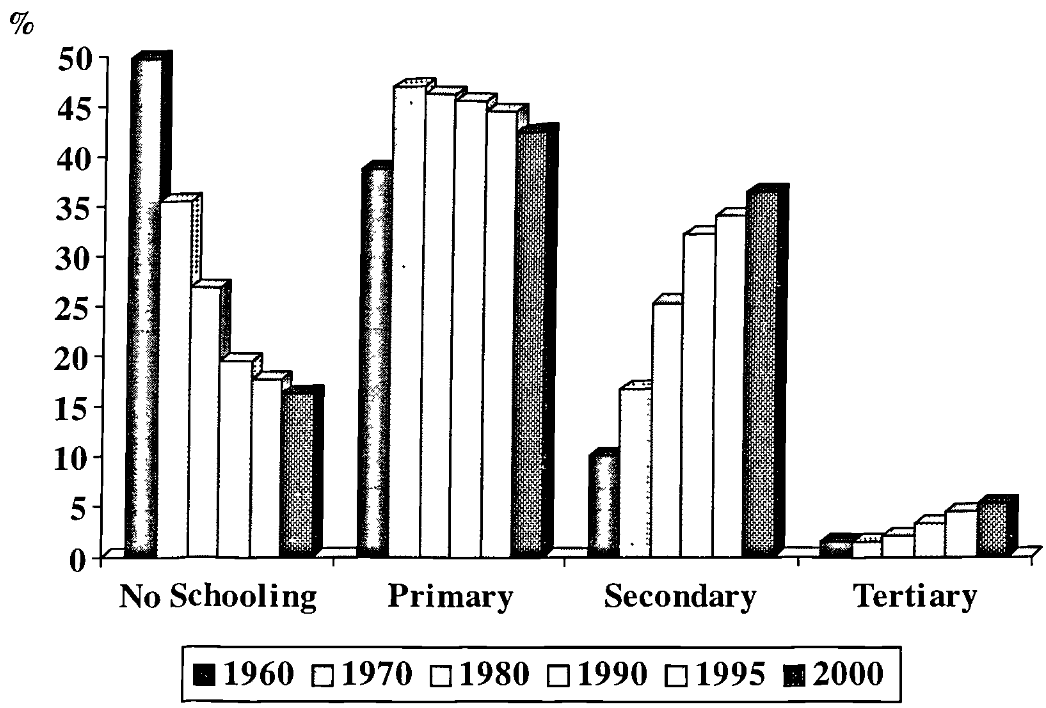
In the Barro and Lee data sets, the three levels of educational attainment have been calculated to equal to 100 percent within the reference year. For example, in Taiwan, the proportion of the population aged 15 and over with no schooling in 1960 is 37.3 percent, 42.6 percent with primary school attainment, 16.3 percent with secondary school attainment and the remainder 3.8 percent with tertiary education attainment. The level of attainment here refers to those who completed that particular level of education but did not proceed on to the next level.

Therefore, if we move along the bars of the presented data in Graph 2.3, we ideally would like to see the column of bars decrease over time for the no schooling levels and possibly at the primary schooling attainment level. A decrease at the no schooling level would depict that there are fewer people among the population aged 15 and over without any schooling.

The no schooling figures calculated by Barro and Lee shows that the proportion of the population without any schooling has been decreasing over the 3 decades. In Malaysia, this figure has decreased by more than 50 percent from 1960 to 2000. In comparison with other countries such as Singapore, Hong Kong, Thailand and Taiwan, we find a similar situation occurring. For example, in Singapore, the no schooling attainment level decreased from 46.2 percent in 1960 to more than half the figure, i.e. 16.4 percent in 2000. In Indonesia, those without any schooling decreased by about half (68 percent to

32.4 percent) from 1960 to 1990 while in Korea, the no schooling population decreased by more than 80 percent (43.8 percent in 1960 to 6.5 percent in 2000) within the 3 decades.

Graph 2.3: Percentage of Population aged 15 years and over – Schooling level Attainment



At the primary schooling level, the proportion of Malaysians aged 15 and over with primary schooling attainment was rather consistent from 1960 onwards at the mid-40 percentage mark. Comparing the Malaysian data with the data of other countries like Taiwan, Hong Kong and Korea, the proportion of those who had had at least primary schooling attainment in Malaysia were higher, indicating that there was a higher proportion of Malaysians who had not proceeded onto the next schooling level. A similar trend was seen for countries like Indonesia and Thailand (Refer to Tables (i) and (ii) in the appendix).

At the secondary schooling level, about two-fifth of the population aged 15 and over in Malaysia is projected to have attained education up till the secondary level in 2000 compared to one-tenth of the population aged 15 and over in 1960. The Malaysian projected figures for 2000 were comparable to some of its neighbouring countries like Singapore (Refer to table (iii) in the Appendix). At the higher education level, the proportion of Malaysians attaining higher education increased from 1.5 percent in 1960 to 5.2 percent projected for the year 2000.

Although the Malaysian higher education numbers are not comparable to the numbers calculated for the other countries like Taiwan with 19.6 percent of its population aged 15 and over projected to have attained higher education or Korea with 26.3 of its population aged 15 and over projected to have attained higher education in the year 2000, the proportion of Malaysians having progressed and attained higher education have been increasing in the 4 decades as shown by the data.

Looking at the average number of years of schooling using Table 2.9, we find that the average number of years of schooling for a Malaysian was 7 years in 2000. The average number of years of schooling more than doubled from 3 years in 1960 to this projected number in 2000. Singapore and Thailand were the other two countries in the region that had the same number of projected years of average schooling in 2000. However, when we compare the initial conditions in 1960, Malaysia appeared to have been able to catch up with Thailand and Singapore fairly quickly to achieve similar levels of average years of schooling in the year 2000.

Table 2.9: Average years of schooling, 1960-2000

	1960	**1965**	**1970**	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**
Taiwan	3.87	4.61	5.31	6.41	7.61	7.62	7.98	8.37	8.76
Thailand	4.30	3.80	4.09	4.03	4.43	5.18	5.58	6.08	6.50
Malaysia	2.88	3.39	3.90	4.43	5.09	5.48	6.03	6.49	6.80
Singapore	4.30	4.63	5.05	5.49	5.50	6.10	5.96	6.72	7.05
Japan	7.78	7.59	7.45	7.78	8.51	8.74	8.96	9.23	9.47
	1960	**1965**	**1970**	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**
Korea	4.25	5.39	4.91	6.60	7.91	8.68	9.94	10.56	10.84
Hong Kong	5.17	5.90	6.31	6.76	7.95	8.39	9.15	9.28	9.41
Indonesia	1.55	1.83	2.87	2.98	3.67	4.00	4.01	4.55	4.99
United States	8.49	9.09	9.53	9.69	11.86	11.57	11.74	11.89	12.05
United Kingdom	7.85	7.36	7.66	8.03	8.27	8.52	8.77	9.09	9.42

Source: Barro-Lee educational attainment data set (2001).

2.4 CONCLUSION

The development of Malaysia and its economic growth have been relatively easy to trace and follow considering that one Government has been in power since 1955. The coalition Government, the *Barisan Nasional* has held on to the Government position for 9 consecutive elections. While the Government has not changed hands, the leaders leading the Government has changed and each individual leader and cabinet has had to face different challenges in the political and socio-economic condition of the country. Based on the various conditions and looking at the economic growth of the country (Refer to summary of statistics presented in Table 2.10 below), one could say that Malaysia has been fairly successful in achieving its status today with a multiracial population.

Malaysia made a transition from an agrarian based economy to an industrialised based economy by the end of the 1980s. Malaysia's economic growth was supported and spurred on by contributions from the agriculture sector in the early decades of economic development. This was followed by industrialisation in the 1980s. Within its trade policies, Malaysia has gone through stages of Import-Substitution Industrialisation (ISI) strategies to Export-Oriented Industrialisation combined with ISI strategies. The role of the Government has always been prominent in Malaysia and it remains as one but without sidelining the private sector. The Government has begun to change the role of the private sector in the development of Malaysia. Via liberalisation in various sectors, the latest one being the education and training sector, the private sector has now been labelled as the engine to growth.

Table 2.10 summarises the statistics presented in the first part of this chapter used to detail the development of the Malaysian Economy.

Table 2.10: Summary of selected economic indicators in the Malaysian Economy

	Pre-NEP Period 1957-1970**	**NEP Period 1971-1990****	**NDP Period 1991-2000***
Real GDP Growth (%)	6.0	6.7	6.4
Inflation Rate (%)	0.93	4.5	3.4
Gross Domestic Investments (% of GDP)	19.5	31.9	36.8
Gross Domestic Savings (% of GDP)	24.1	28.6	38.0
Government Deficit (% of GDP)	n.a.	-6.8 +	-1.0
Current Account Deficit (% of GDP)	n.a.	-1.6 ++	-0.58

Note:
* OPP3
** Own calculation using the World Bank Development Indicators, 2000
\+ 1972-1990
++ 1974-1990

Over time, we have seen Malaysia's economic performance in its boon and bane periods and it appears that Malaysia has been rather successful in pulling itself out of its troubled periods fairly quickly. For instance, Malaysia was well on the recovery path in 1987, just 2 years after the recession caused by the oil crisis in 1985. The year 1997 was the beginning of another troubled period for Malaysia. However, according to the Economic

Report of 2000/2001, real GDP growth rebounded to a 5.8 percent in 1999 from a contraction of 7.4 percent in 1998 (Malaysia, 2000). Although Government intervention was needed to nurse the economy back to its feet in this recent crisis, the Government is still adamant that the private sector should take the lead in the future growth of Malaysia.

The Malaysian population was 10.9 million in 1970, 13.7 million in 1980, and 18.4 million in 1991 and is estimated to stand at 23.3 million at the end of the year 2000 (Malaysia, 2000). It is this population that will provide the human capital to the economic development of Malaysia.

From the time of independence from the British, education has been used as a social unity tool. It was firstly used to unite and integrate the three races within the Malaysian population. The second purpose of the education and training sector appeared during the later periods of development in Malaysia. Its role as a tool to produce a knowledgeable, trained and skilled society gained recognition at the end of the NEP period and is featured strongly in this period and in the newly launched National Vision Policy period of 2001-2010.

Based on the data that is available, Malaysia appears to be on a road of good progress in terms of its human capital performance via the commitment showed through the increase in Government expenditure for education and training and through the increasing HDI calculated by the UNDP. Even though Malaysia may not seem to be performing as well as the other countries in the region, the positive development of the human capital factor in Malaysia (as measured by the educational attainment figures calculated by Barro and Lee) can clearly be seen from the changes in the figures in 1960 to those projected to be obtained by the end of the year 2000.

On the whole, we have traced two elements of development in Malaysia, one, the development of the Malaysian economy and two, the human capital development. Within the Malaysian economy, the education and training sector has evolved based on the changes in the policies surrounding this sector. It began as a sector, which the Government was willing to set aside in the early periods of development. It then became a strong social tool, which assisted in the integration of the three races in Malaysia. This sector has currently leapt into becoming one of the leading sectors of the Malaysian economy.

The Malaysian Government believes that education and training is a sector that will contribute to the achievement of Vision 2020. This rapid development and progress in the Malaysian education and training sector provides us with a reason to conduct this empirical study. We aim to contribute towards the understanding of the link between the growth of human capital via education and training and its link with the development of the Malaysian economy.

To assist us in achieving this objective, we will firstly look into the theories and models that have been derived to explain the role of human capital in the economic growth of countries in the next chapter.

APPENDIX

Table (i): Proportion of Population aged 15 and Over without any schooling

	1960	1965	1970	1975	1980	1985	1990	1995	2000
Taiwan	37.3	31.9	26.6	19.6	15.7	13.8	12.4	11.1	10.0
Thailand	36.9	32.2	24.8	24.7	14.4	15.7	16.3	14.3	12.6
Malaysia	49.7	41.4	35.3	31.0	26.8	23.0	19.4	17.6	16.2
Singapore	46.2	40.6	34.5	28.8	35.0	28.2	23.3	17.3	16.4
Japan	2.4	2.0	1.8	1.7	0.3	0.3	0.2	0.2	0.2
Korea	43.8	31.9	31.0	17.0	13.3	10.9	8.0	6.7	6.5
Hong Kong	29.7	27.5	23.9	20.2	16.1	14.1	12.8	11.8	11.3
Indonesia	68.0	63.7	45.2	43.0	31.9	23.6	43.6	37.0	32.1
United States	2.0	1.8	1.4	1.8	0.9	1.4	1.1	0.5	0.8
United Kingdom	2.0	3.2	4.1	3.9	3.7	3.7	3.7	3.6	3.3

Table (ii): Proportion of Population aged 15 and Over with Primary schooling attainment

	1960	1965	1970	1975	1980	1985	1990	1995	2000
Taiwan	42.6	42.7	38.9	40.3	35.6	31.9	29.6	27.0	24.2
Thailand	55.3	59.9	67.3	65.6	70.2	68.3	66.9	63.7	61.5
Malaysia	38.6	44.2	46.7	46.6	46.0	45.6	45.4	44.3	42.4
Singapore	21.3	25.5	29.7	32.8	23.5	26.6	37.6	40.8	39.0
Japan	47.2	42.9	47.3	43.7	38.6	35.3	32.1	29.6	27.5
Korea	36.2	39.5	39.1	36.5	28.3	20.9	16.1	13.9	11.9
Hong Kong	45.1	40.9	41.0	39.9	34.2	29.2	25.1	25.5	25.2
Indonesia	28.6	31.8	46.7	47.3	55.1	63.5	30.4	33.6	35.5
United States	36.8	34.5	32.6	30.2	5.1	4.9	8.6	8.1	8.2
United Kingdom	65.3	61.3	54.3	49.3	46.1	43.0	40.8	38.1	35.4

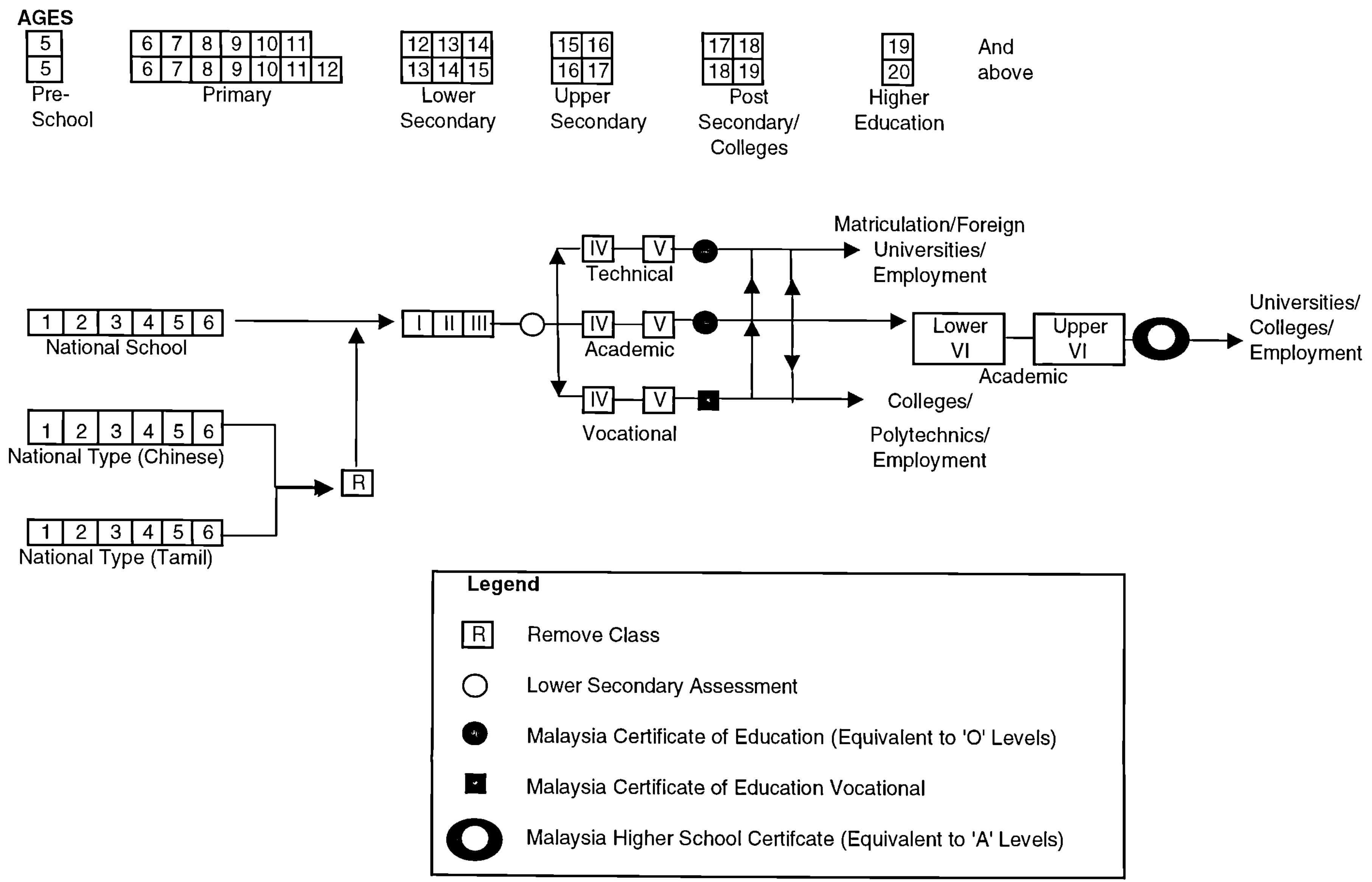
Table (iii): Proportion of Population aged 15 and Over with Secondary schooling attainment

	1960	1965	1970	1975	1980	1985	1990	1995	2000
Taiwan	16.3	21.0	28.8	33.5	38.8	43.1	43.8	45.2	46.2
Thailand	7.0	7.2	6.9	8.3	12.3	10.5	9.8	13.0	15.1
Malaysia	10.1	12.9	16.6	20.7	25.1	28.7	31.9	33.8	36.2
Singapore	32.5	32.9	33.9	35.4	37.7	39.8	34.8	34.5	34.6
Japan	44.8	48.7	42.9	44.7	45.5	47.9	50.2	50.4	50.1
Korea	17.4	24.7	25.3	39.8	49.2	54.7	61.9	57.2	55.2
Hong Kong	21.0	26.6	32.5	36.6	43.0	49.5	50.8	50.4	50.2
Indonesia	3.4	4.0	7.6	9.0	12.4	12.3	24.2	26.2	27.8
United States	46.7	46.9	45.6	43.5	66.2	61.6	47.3	47.1	42.9
United Kingdom	31.2	33.2	34.8	37.3	39.9	41.7	42.0	41.5	41.7

Table (iv): Proportion of Population aged 15 and Over with Higher education attainment

	1960	1965	1970	1975	1980	1985	1990	1995	2000
Taiwan	3.8	4.4	5.8	6.5	9.9	11.2	14.2	16.7	19.6
Thailand	0.7	0.8	1.0	1.4	3.0	5.5	7.1	9.0	10.9
Malaysia	1.5	1.5	1.5	1.7	2.0	2.6	3.3	4.4	5.2
Singapore	0.0	1.0	1.9	3.0	3.9	5.4	4.3	7.3	10.0
Japan	5.6	6.4	7.9	9.9	15.6	16.5	17.4	19.8	22.2
Korea	2.6	3.9	4.6	6.6	9.2	13.5	13.9	22.2	26.3
Hong Kong	4.3	4.9	2.6	3.3	6.6	7.2	11.2	12.2	13.3
Indonesia	0.1	0.5	0.4	0.7	0.6	0.5	1.8	3.2	4.5
United States	14.5	16.8	20.3	24.6	28.1	32.1	42.9	44.2	48.1
United Kingdom	1.5	2.4	6.8	9.5	10.3	11.6	13.5	16.7	19.6

EDUCATION SYSTEM IN MALAYSIA



CHAPTER 3

THEORIES AND MODELS OF THE ROLE OF HUMAN CAPITAL IN ECONOMIC GROWTH: AN OVERVIEW

3.1 INTRODUCTION

> "The difference between the most dissimilar characters, between a philosopher and a common street porter, for example, seems to arise not so much from nature as from habit, custom and **EDUCATION**" (emphasis added)
>
> Adam Smith, 1776

> "...we have to consider the **TRAINING** that is required to develop its industrial efficiency" (emphasis added)
>
> Alfred Marshall, 1891

The role of education and training in the economy has been acknowledged from the early days as depicted in the quotes above. The work of Smith[18] and Marshall, which looked into the differences between skilled and unskilled labour and the relationship between earnings and education had opened the door for future work on education and training, such as that by Becker [19](1964) and Mincer (1974).

In the early days of Smith and Marshall, the role of education and training was difficult to quantify but this did not deter these two economists from being optimistic about the role of education and training. Marshall had highlighted that not only does education or

[18] Adam Smith saw education as a contribution to the difference in wages between a skilled labour and those of an unskilled labour (creating the compensating differential concept).

[19] Becker's work is said to have "actually constructed the foundations of the subject (of education and training) for the first time" (Blaug as quoted in Bowman, 1990).

training have direct benefits to employers and employees, *"but a good education confers great indirect benefits even on the ordinary workman"*[20] (Marshall, 1891).

However, as we progress through time, the feasibility of quantifying the role of education and training has been made possible via the availability of data sets collected and formed over time, in addition to the sophisticated machines and software programmes that are available to allow economists to attach figures of measurement to this issue.

In this chapter, we aim to look at the various ways that economists have used to quantify the role of education and training or what can be termed as human capital. The methods can be divided into the macro and the micro approaches. For ease of exposition, we will divide the chapter as such. The next section will look into the macro approaches that investigate the contribution and profitability of education to an economy. This is followed by a section, which will present the approaches taken and derived for a micro level analysis. This will include a section on the issues (e.g. the problems and advantages of the methods) tied in with the micro level approach. This chapter ends with a conclusion.

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[20] "It stimulates his mental activity; it fosters in him a habit of wise inquisitiveness; it makes him more intelligent, more ready, more trustworthy in his ordinary work; it raises the tone of his life in working hours and out of working hours, it is thus an important means towards the production of material wealth...." (Marshall, 1891).

3.2 MACRO APPROACHES

As the term macro suggests, the approaches here are models, which emphasises the interaction in the economy as a whole. The motivation for deriving such models was to identify the contributing factors to economic growth and later on, to solve the question of why growth rates differed among countries, regions and so on. In relation to human capital, these models look into what education and training means to an economy.

The contribution of education and training and other inputs of production to economic growth are calculated by using the growth accounting method.[21] The growth accounting method is based on the concept of an aggregate production function, which links output (Y) to the input of physical capital (K) and labour (L). This basic function is as follows: -

$$Y = K^{\alpha} L^{\beta} A_t \qquad (3.1)$$

where Y is the quantity of real output

K is the quantity of capital

L is the quantity of labour and

A_t is the residual, factors not explained by the inputs and is usually labelled as total factor productivity (TFP), which refers to technical progress.

[21] This basic equation became the basis for growth models such as that derived by Solow (1967), Denison (1962), Romer (1990), amongst others.

Taking the logarithms of the various variables and differentiating the equation with respect to time, the equation will be converted to the rate of growth form.

$$\frac{d\log Yt}{dt} = \frac{d\log At}{dt} + \alpha\frac{d\log Kt}{dt} + \beta\frac{d\log Lt}{dt} \tag{3.2}$$

The α and β are the coefficients signifying the elasticity of the particular input, i.e. the elasticity of output with respect to capital and the elasticity of output with respect to labour. In the Cobb-Douglas production function, it is assumed that there are constant returns to scale, whereby $\alpha + \beta = 1$. Using equation (3.2), we will be able to calculate the contributions of capital and labour to growth and the residual measuring technical change, represented by the first term on the right hand side of equation (3.2).

Where does the role of education and training come into the model? If using the above equation, we could say that the impact of education is lodged in the residuals, which is commonly known as the total factor productivity, i.e. technical progress. This encompasses changes in the quality of the workforce (which could arise from a change in the quality or amount of education received) and other aspects not contained in the K and L variables. Using this interpretation would not allow us to have a separate measure of human capital's impact on economic growth.

Griliches (1970) suggested 2 ways of using the production function to test for the role of education. In the first method, the labour input is "corrected" for its quality whereby, L =

E*N, where N is the 'unweighted' number of workers and E is an index of the quality of the labour force, i.e. education or skill level.

Taking this quality corrected labour into equation (3.1), we have

$$Y = K^{\alpha} E^{\beta} N^{\beta} A_t \tag{3.3}$$

The coefficient on E, which measures labour quality, would indicate the importance of education or training (through its significance) and the impact of this variable on the growth of output, measured by β.

The second method recommended by Griliches is one where a measure of human capital is inserted into the production function.

$$Y = K^{\alpha} L^{\beta} H^{\gamma} A_t \tag{3.4}$$

where H is the measure of human capital.

This second method[22] suggested by Griliches appears to be the one that is frequently used by growth economists to analyse the impact of education on economic growth (amongst

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[22] Conlisk (1970) shows evidence that the first method is a method that is closer to real life conditions. Conlisk presented different consequences of the long-run growth behaviour of both models. He found that L, the number of workers in the second model became a barrier to further growth with expansion of K and H. This did not appear to be prevalent in the first model where the quality of labour was taken into consideration. The first model was also able to explain the equilibrium behaviour of both rich and poor countries. Due to these findings, Conlisk indicated preferences for the first model suggested by Griliches, which took labour quality into consideration.

others, Lau, et al. (1993), Tilak (1990), Gapinski (1997), Woo (1991)). Equation (3.4) in the familiar equation of growth accounting gives us,

$$\frac{d\log Yt}{dt}=\frac{d\log At}{dt}+\alpha\frac{d\log Kt}{dt}+\beta\frac{d\log Lt}{dt}+\gamma\frac{d\log Ht}{dt} \qquad (3.5)$$

The right hand side terms in the above equation measures the contribution of technical progress, capital, labour and human capital respectively to the growth in output. The human capital variable is usually measured by the average number of years of formal education per person of the labour force (e.g. Lau et al., 1993). In other cases, enrolments into the various levels of schooling were used (e.g. Tilak, 1990). Researchers have also attempted to use estimated human capital stocks based on available educational attainment and enrolment data of the particular countries investigated (e.g. Benhabib and Spiegel, 1994). In countries where data on human capital is scarce, researchers have resorted to using proxies such as educational expenditure and literacy rates to gauge the impact of education and training on economic growth.

The results obtained from using this production function methodology have so far revealed a positive impact of human capital on economic growth. This model was widely used in growth investigating studies from the 1960s until the late 1970s. The fad of using the production function to investigate the impact of the various inputs on economic growth gradually died down till the late 1980s and early 1990s when the production function approach was once again in the limelight of economics, in particular in the area of economic growth and development. "The new growth theory" spurred fresh rounds of attention on growth issues among economists and policy makers. This was based on the work of Lucas (1988) and Romer (1990), which revived interest in the role of human capital on economic growth.

The production function approach remained with new rules. The assumption of diminishing returns to capital was relaxed and constant or increasing returns was allowed. The role of human capital was enhanced and it became the engine of growth according to the new growth theory. Two main findings on the role of human capital were established. Firstly, it maintained its role as an input of production. This was as per advocated in the initial set of production function based growth studies where accumulation of human capital has an impact on the growth rate of a country's output. The second finding was that human capital worked its way through the technical progress measured by total factor productivity (TFP) of the production function results.[23]

There is a spillover of human capital onto technological changes, indicating that human capital makes innovation happen by having the capacity and ability to absorb and adapt to technical change. This leads to the identification of the indirect benefits of human capital

[23] This finding cannot be advocated as a new and original finding as an early study supporting this human capital role was in existence in the 1960s, i.e. Nelson and Phelps (1966).

to economic growth via Research and Development (R&D) where an educated labour force is able to contribute significantly to technical progress and hence economic growth.

It is this second finding that motivated the studies investigating the role and magnitude of human capital on TFP. The following equation is applied.

$$TFP = f\,(H) \tag{3.6}$$

where H is the human capital variable and TFP is the Solow residual.

This model implies that H influences the growth of TFP in the short-run (Benhabib and Spiegel, 1994). Various studies have adapted this framework to take other variables into consideration. For example, in the Benhabib and Spiegel paper, they adapted the model to allow for 'catch-up' of technology (which was also implemented to achieve the purpose of their cross-country study). The 'catch-up' argues that a country's technological level will follow a leading country and is not an exogenously growing theoretical level of knowledge.

Based on the argument that human capital plays a role through R&D, Coe and Helpman (1995) derived a model that links TFP with domestic and foreign R&D. The usage of a separable variable depicting foreign R&D in Coe and Helpman's model was to capture further technological innovation. The argument is that a country's TFP is not only dependant on its own innovation (as measured by the domestic R&D variable) but is also dependent on foreign R&D that is "imported". The importation of foreign R&D works via the international trade link that one country has with another country.

However, in an extension of the Coe and Helpman model by Engelbrecht (1997), Engelbrecht notes that the R&D measure is not a blanket variable, which would be able to cover all aspects of human capital such as on-the-job training or 'learning-by-doing'. Building from this argument, the Coe and Helpman model of linking TFP with R&D (as shown in equation (3.7)) is amended to become equation (3.8). The additional variable is the H component, which is the domestic stock of human capital that is meant to capture the left out aspects, i.e. the benefits from the on-the-job training and learning by doing that takes place in an economy.

$$TFP = f\,(S^d,\ m*S^f) \qquad (3.7)$$

where S^d is the domestic R&D capital stock,

m is the fraction of imports in GDP, which is included on the basis that as import share increases, the higher the possibility that a particular country will benefit from foreign R&D and

S^f is the foreign R&D capital stock.

$$TFP = f\,(S^d,\ m*S^f,\ H) \qquad (3.8)$$

H refers to the domestic stock of human capital.

The models presented in this section require data with a time-series element, which requires the usual economic diagnostic tests on data of this kind such as autocorrelation, heteroskedasticity (especially in cross-country studies, which incorporates time series cross section (TSCS) type of data) and the test for stationarity using unit-root tests. By using these models, economists are able to ascertain the contribution of human capital in an economy. As noted earlier in this section, by being able to measure the impact of human capital on an economy, explanations on why countries differ in terms of their economic growth can now be provided. Unfortunately, these models are not free from flaws or weaknesses. The following paragraphs outline some of the arguments which constitute the weaknesses of the macro models.

The appearance of work on the reliability of results obtained via the growth accounting method came in force after Young (1995)'s study on the East Asian miracle growth. In Young's paper, the East Asian country growth was not a miracle but was due mainly to capital accumulation from the low TFP results that his estimations had revealed. An interesting account of the development of the "rows" on the Solow residual or the TFP can be found in Felipe (1999).

The general notion that is captured from the literature on the growth accounting method is that there could be something more than just capital, labour and TFP growth to explain the dynamics of a country. The growth accounting method is sensitive to the type of data used. In addition to being concerned about the quality of data that is used, researchers should be aware of problems such as heterogeneity, outliers and more importantly, model uncertainty (Temple, 1999a).[24]

Although Felipe notes that the problems underlying the notion of TFP are significant, he also does note that work using this method is not done in vain. He draws attention towards the possibility of finding other avenues of research that could help explain the growth dynamics of a country especially that of the East Asian economies which had sparked off the debate between the TFP followers and the input accumulation (For example, Young, 1995 and Krugman, 1994)[25] advocates.

In summary, this section is an attempt to provide a brief overview of how economists measure the impact of human capital on economic growth via the macro approach. Although these models may be surrounded by different problems, as time evolves, with better quality data and continued interest in improving the model(s) used, the results obtained could well become more reliable and garner more confidence among economists and those with an interest in the role of human capital on economic growth. The next section will cover the micro approaches taken to measure the impact of human capital.

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[24] For a full discussion of these issues, see Temple (1999). Another paper summarising the growth accounting study results is Farberger (1994) and a book devoted to economic growth models is Barro and Sala-I-Martin (1995).
[25] Young (1995)'s study which showed TFP values of virtually zero for Singapore had led to "Krugman's Thesis" which debunked the East Asian Miracle growth to simple capital accumulation.

3.3 MICRO APPROACHES

In the micro approach, individual level analysis is incorporated. These studies are better known as the rate of returns to education studies. In the rate of returns to education studies, two rates of returns can be measured, one, the private rate of returns and the second, the social rate of returns. The private returns measure the relationship between costs and benefits of education for the individual. On the other hand, the social rate of returns to education measures the relationship between all the social cost of education that must be borne by society as a whole and the benefits that are expected to accrue to society (Psacharopoulos and Woodhall, 1985).

The private rate of returns is one of the factors that determine individual demand for education, how education should be financed and how the costs and benefits of education should be distributed. The social rate of returns could be used to compare investments in education with public or private investments in physical capital or, more frequently, it is used to compare the costs and benefits of different types of level of education for a society (Psacharopoulos and Woodhall, 1985).

For a clearer distinction between the private and social rates, Table 3.1 shows the social and private costs of education while Table 3.2 shows the social and private benefits of education.

Table 3.1: Social and Private Costs of Education

Social Cost	Private Cost
Direct Costs	
Teacher's salaries	Fees, minus average value of scholarships
Other current expenditures on goods and services.	
Expenditure on books, and so on	
Imputed Rent	
Indirect Cost	
Earnings forgone by pupils/students	Earnings foregone by pupils/students

Source: Psacharopoulos and Woodhall (1985)

Table 3.2: Social and Private Benefits of Education

Social Benefits	Private Benefits
Higher lifetime value of economic output of educated workers	Higher lifetime earnings
Non-pecuniary benefits for educated workers	Non-Pecuniary benefits (e.g. enjoyment of cultural products including the education experience itself)
External benefits (such as crime reduction, and so on)	

It should be noted that externalities (in Table 3.2, they are *positive externalities*) are extremely difficult to measure empirically. According to Psacharopoulos (1985), studies like Weisbrod (1964) and a study by Haveman and Wolfe (1984) had cited external benefits of education as crime reduction, social cohesion, technological innovations and intergenerational benefits, i.e. benefits which parents derive from their own education and transmits to their children. With regard to developing countries, other important external or spillover effects that education may have are on fertility and on standards of health and nutrition. Recent work on this issue of externalities that can be obtained from education and the social rate of returns to education can be found in the International Journal of Education Research (1997).[26]

There are 3 distinct approaches in estimating the returns to education. In order of increasing complexity, the three approaches are: -

3.3.1 Short-cut Method

The short-cut method assumes that the percentage increment in earnings is strictly proportional to the absolute difference in the time spent at school, with the rate of returns as the coefficient of proportionality (Mincer, 1974).

$$\ln Y_s = \ln Y_o + r S \qquad (3.9)$$

where S is the level of schooling

r is the discount rate and

Y_s is the annual earnings of an individual with S years of schooling

In Gindling, et al. (1995), the rate of returns to education was obtained through the calculation of the percentage difference in mean wages between each education group. This simple tabulation is only a first approximation to the rate of returns to education at different levels.

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[26] Chapter 3 of Volume 27, issue 6 of this journal details the nonmarket effects of education. Wolfe and Zuvekas detail how these nonmarket effects can be measured.

3.3.2 Human Capital Earnings Function

The short cut method may provide an indication of the rate of returns to education in countries where data is scarce. It cannot be denied that the difference in average wage between education levels could be due to differences between the individuals at each education level in other earning determining characteristics. For example, an individual could be earning more than another could because they are older and more experienced and not only because they are more educated. To take these characteristics into consideration, another method is the human capital earnings function or better known as the Mincerian Earnings function (Mincer, 1974). The basic equation applied is as below:-

$$\ln Y_i = \alpha + \beta S_i + \gamma_1 EXP_i + \gamma_2 EXP_i^{\ 2} + \varepsilon_i \qquad (3.10)$$

where S_i is the number of years of schooling of individual i, EXP_i and EXP_i^2 are years of experience and its square.

The constant term (α) can be interpreted as providing estimates of the logarithm of average annual earnings without schooling. The coefficient on S (β) is interpreted as the average rate of returns to one additional year of schooling, regardless of the level of schooling. With the logarithm of income as the dependant variable, an increase of one unit, that is, one year in schooling (S) increases income by approximately 100*β percent. Given the Mincerian assumption that forgone income or earnings is the only cost of schooling, the cost of one year of schooling is Y, which generates 100*β percent annual increase in Y.

If the estimation of equation (3.10) were based on individual income or earnings, β would be a measure of the private rate of returns to schooling. On the other hand, if the estimation is done from aggregate data, β may be interpreted as the social rate of returns, since all external effects of education on income should have been captured in the aggregate output measure. In either case, the rate of returns interpretation is based on the assumption that forgone earnings represent the entire cost of schooling (Ram, 1996).

The role of the coefficient on experience, EXP_i ($\gamma_1>0$) is to measure on-the-job skill acquisition while the EXP_i^2 ($\gamma_2<0$) assumes that the returns to on-the-job skill acquisition declines with time. This experience variable[27] is usually measured by: -

Experience = Age – Schooling – (School starting-age)

The earnings function (Equation (3.10)) can be adapted to estimate average returns to different levels of schooling by using a series of dummy variables to represent the different levels of schooling. After fitting in the dummies, the extended function may be written as

[27] Proxies commonly used for this experience variable are AGE and AGE^2. When these proxies are used, the rate of returns estimate will generally be lower than those obtained using the potential experience variables (Harmon, et al., 2000)

$$\ln Y_i = \alpha + \beta_1 PRIM_i + \beta_2 SEC_i + \beta_3 VOC_i + \beta_4 UNIV_i + \gamma_1 EXP_i + \gamma_2 EXP_i^{\ 2} + \varepsilon_i \quad (3.11)$$

In equation (3.11), the variables $PRIM_i$, SEC_i, VOC_i, $UNIV_i$ are dummy variables indicating primary, secondary academic, secondary vocational and university education completed by individual i. The private rate of returns to the different levels of schooling are then calculated by dividing the coefficient of the various schooling level by the average number of years of education for that particular schooling level. For example, if the average number of years of schooling at the primary level is 6, one could obtain a crude measure of the rate of returns to primary schooling, $r_{PRIM} = \beta_1/S_{PRIM}$ where S_{PRIM} is 6. Alternatively, the marginal rate of returns to successive levels of education (we use the transition from the primary schooling level to the secondary education level to illustrate the formula) could be calculated as $r_{(SEC\ vs.\ PRIM)} = [\ (\text{antilog}\ (\beta_2 - \beta_1)/(S_{SEC}-S_{PRIM})) - 1] * 100$. This marginal rate of returns will be able to give us the returns to education for each additional year taken to achieve the next level of education.

Other than using the different levels of education in the series of dummy variables, the dummy variables could also represent the levels of qualification, for example, certificates/diplomas, a Bachelor degree, a Master degree or a PhD/Doctorate to estimate the returns to the different levels of education. The usage of dummy variables such as the latter may be more appropriate and less misleading as it indicates the completion of a certain level of education.

The earnings function has been a frequently used methodology in estimating the returns to education and it would be appropriate to reminisce on its derivation. The derivation of the earnings function can usually be found in most basic labour economics undergraduate textbooks, and to assist in the explanation in this section, the notations used are based on that extracted from Polachek and Siebert (1993).

An investor is usually concerned of the returns that he or she may get from the money that is being invested. Likewise when it comes to education and training, the person obtaining either the education and/or training would be interested to know the returns that they would be able to get from the time and money spent in enhancing their human capital. We define C_t as the dollar expenditure on net human capital investment in any time period t and r as the returns that one could obtain from that investment. E_t is potential earnings and Y_t is observed earnings.

Polachek and Siebert note, *"Investment theory dictates that potential earnings in the following year would be augmented by the returns on initial investment rC_0."* This allows us to say that, potential earnings in period 1 are equal to potential earnings in the initial period plus the returns on initial investment.

$$E_1 = E_0 + rC_0 \tag{3.12}$$

By applying the investment theory to subsequent periods of investment, we will obtain the general equation of

$$E_t = E_0 + r\sum_{i=0}^{t-1} Ci \qquad (3.13)$$

The component, C_t, which Polachek and Siebert terms as dollar investments are calculated by taking potential earnings, E_t minus observed earnings, Y_t.

$$C_t = E_t - Y_t \qquad (3.14)$$

However, given the difficulty of obtaining data on the dollar investment component, C_t, Mincer introduced a component to ease the calculation of this dollar investment component by considering the time spent on investing. Mincer labelled this component as the 'time equivalent investment,' s_t and

$$C_t = s_t{*}E_t \qquad (3.15)$$

The introduction of s_t renders the earnings function an efficient user of data. Chiswick (1997) highlights that although data on earnings, years of schooling and years since leaving school are readily available, data on individual schooling cost are not readily available. Hence, we can see that the earnings function procedure involves converting a relationship between earnings and dollar investments in human capital to one between the natural logarithm of earnings and years of investment in schooling and training.

Substituting s_t for dollar investment,

$E_1 = E_0 + rs_0E_0 = E_0[1 + rs_0]$

$E_2 = E_1 + rs_1E_1 = E_1[1 + rs_1]$

$E_t = E_0[1 + rs_0][1 + rs_1]\ldots[1 + rs_{t-1}]$

$$= E_0 \prod_{i=0}^{t-1}[1+rs_i] \tag{3.16}$$

Taking logarithms of both sides of equation (3.16),

$$\ln E_t = \ln E_0 + \sum_{i=0}^{t-1}\ln[1+rs_i]$$

Assuming that s_i and r are relatively small, we can write the above equation as:

$$\ln E_t = \ln E_0 + r\sum_{i=0}^{t-1} s_i \tag{3.17}$$

By using the logarithm of earnings as the dependant variable in the equation, Chiswick notes that the residual variance in this equation is less heteroskedastic and that the distribution of the residuals is closer to normal. The s_i component can be divided into two parts, a full-time schooling period and a post-schooling period. Equation (3.17) can then be presented as follows after considering both time periods mentioned.

$$\ln E_t = \ln E_0 + r_s\sum_{i=0}^{S} s_i + r_p\sum_{i=s+1}^{t-1} s_i \tag{3.18}$$

S in equation (3.18) represents years of schooling, r_s is the rate of returns to schooling and r_p is the rate of returns to post-school investment. Equation (3.18) can be simplified, assuming that $s_i = 1$ during the schooling phase.

$$\ln E_t = \ln E_0 + r_s S + r_p \sum_{i=s+1}^{t-1} s_i \qquad (3.19)$$

The next assumption placed on the earnings function is that the post-schooling investment component declines monotonically with experience. This final assumption gives us the current earnings function that is widely used.

$$\ln E_t = \ln E_0 + r_s S + a_1 t + a_2 t^2 \qquad (3.20)$$

or in the form as presented at the beginning of this section, i.e. equation (3.10).

This earnings function can be extended by including other variables which are assumed to affect earnings like hours worked in a week, gender, marital status, tenure and so on (See Gindling, et al. (1995), Deolalikar (1993) and Miller et al. (1995)). This gives the function its flexible characteristic, whereby Chiswick notes; *"the ...earnings function is flexible, allowing for easy incorporation of additional variables appropriate for the particular purpose of a study."*

From the specification of the human capital earnings function model, data would appear to be slightly easier to obtain compared to the type of data that is needed by the production function or the macro level model. Many a times, we will find that cross section data on individuals collected via surveys have been used to derive the rate of returns to education. Over the span of the 28 years of this model existing, different researchers have identified various issues arising from the usage of this human capital model. In the following section, we will look into these issues.

3.3.2.1 Issues relating to the returns to education in the earnings function.

3.3.2.1.1 The left out variables

One of the issues often raised in using this human capital earnings function is the left out variables. It is said that the conventional estimates of the rate of returns to education are constrained because they are unable to isolate the returns to schooling from the contribution of an individual's ability and the influence of family background (Miller, et al., 1995).

These left out variables, in particular the ability variable are accommodated via the inclusion of a variable that is able to capture these elements. When these variables are taken into consideration, the equation to be estimated is then written as: -

$$\ln Y_i = \alpha + \beta S_i + \gamma_1 EXP_i + \gamma_2 EXP_i^{\,2} + \gamma_3 X + \gamma_4 A + \varepsilon_i \qquad (3.21)$$

where A is the measure of ability.

Without including the ability variable, the OLS coefficient of ln Y on S is biased upward. The bias exists due to the following assumptions:-

- That ability has an independent positive effect on earnings ($\gamma_4 > 0$) above and beyond its effect on the amount of schooling accumulated.
- That the relationship in the sample between ability (A) and the schooling variable (S) is positive.
- The ability variable is the only variable that has been left out and that all other usual least square assumption hold.

Following this, we would then need to identify how ability can be measured. The "ability" variable is measured by IQ test scores or similar test score measures developed by psychologists (Griliches (1977) and Griliches and Mason (1972)). However, Griliches argues that the problem of using IQ test scores or similar test scores as the ability measure is subject to possible large (test-retest) errors. Some also argue that "ability" could just be "energy" or "motivation." The use of any measures for ability appears arbitrary and the definition of ability may differ depending on the circumstances and most important of all, data availability of the research. These ability adjustments cover diverse influences such as rank in class, father's education and occupation, personality, ability to communicate, motivation and even family upbringing (Becker, 1964).

Nevertheless, by using these arbitrary measures, Denison (in Blaug, 1970) concluded that about a third of the earnings differential disappear when one standardises for differences in father's occupation, rank in high school class and IQ scores. Other studies appear to have confirmed Denison's results (Becker, 1964). However, there are also arguments that this alpha coefficient (referring to the "ability" measure) obtained by Denison was based on American data and hence, may not be applicable to other countries, which may face different circumstances. Even though this may be the case, many studies on the rate of returns to education have used an alpha coefficient of 0.6 to adjust the earnings differential (See Hunt and Hicks (1985), Hoerr (1973), Bird (1991)) in order to consider the missing "ability" variable. Supporting the usage of this alpha coefficient, Blaug noted: -

> "...in the absence of relevant evidence, we might follow Denison in applying 0.66 again as a rough-and-ready principle"
>
> Blaug, 1970

Although this rough estimation of the contribution of ability to education has been taken as an acceptable measurement, these studies are quite out-dated and with rapid changes in each individual economy, this adjustment coefficient may be different. It would appear that the best approach would be to re-calculate the alpha coefficient or to apply different levels of this alpha coefficient to the estimation equation. One could use an alpha coefficient ranging from 0.66 to 1.0 where the higher alpha coefficient could be used for the higher schooling profiles. In the latter case, sensitivity tests on the results should then be done to a variety of assumptions about the interaction between ability, family background and education as it would be unjustified to assume that all the earnings differential is entirely attributable to education.

Another solution to overcome this problem is to use data collected from samples of twins (See Miller et al. (1995), Ashenfelter and Krueger (1994) and Ashenfelter and Rouse (1998)). The basic framework used in twin studies is taken from the earnings function which show that the income of an individual is defined as depending on the level of education (S) together with the individual's ability (A) and other influencing factors, for example, family background (F).

$$Y_i = \beta_0 + \beta_1 S_i + \beta_2 A_i + \beta_3 F_i + \ldots + \varepsilon_i \qquad (3.22)$$

In studies using twin samples, equation (3.22) can be rewritten as

$$Y_{ij} = \beta_0 + \beta_1 S_{ij} + \beta_2 A_{ij} + \beta_3 F_{ij} + \ldots + \varepsilon_{ij} \qquad (3.23)$$

Where the subscript i refers to the twin set and the subscript j refers to each member of the twin set (j = 1,2). In a study, which uses identical (monozygotic) twins, who are reared together, the model to explain the difference in income between the members of the twin pair ($Y_{i1} - Y_{i2}$) may be written as

$$(Y_{i1} - Y_{i2}) = \beta_1 (S_{i1} - S_{i2}) + \ldots + (\varepsilon_{i1} - \varepsilon_{i2}) \qquad (3.24)$$

The terms A and F disappear from the equation as the identical twins by definition have the same innate ability and family background. From this model, the degree of bias generated by the omission of the A and F terms may be observed by comparing estimates of β_1 in equation (3.24) with estimates of β_1 in equation (3.23).

In the case of using samples of fraternal twins or dizygotic twins reared together, the model to explain differences in their incomes can be written as

$$(Y_{i1} - Y_{i2}) = \beta_1 (S_{i1} - S_{i2}) + \beta_2 (A_{i1} - A_{i2}) + \ldots\ldots + (\varepsilon_{i1} - \varepsilon_{i2}) \qquad (3.25)$$

The term in F disappears as they are reared together, hence having the same family background but ability may differ between fraternal twins, as they are not identical in their genetic inheritance. Assuming that data on ability in this case is unavailable, the estimate of the effect of education (β_1) on income is a measure that will be biased by the omission of the individual's ability but not biased by the omission of family background.

Therefore, using these four models presented in equation (3.22) to (3.25), one would be able to derive three estimates of the effect of education on income. These three estimates are: -

a) An estimate that is biased by the omission of measures of individual ability and family background (β_1 in equation (3.23)), on the assumption that the two variables are unobservable.
b) An estimate that is biased by the omission of a measure of ability (β_1 in equation (3.25)).

c) An estimate that is not biased by the omission of either a measure of ability or family background (β_1 in equation (3.24))

"Double Solution"

Twins have also been used to gauge for the effect of problems like measurement errors on the returns to education. This has been done via the collection of additional data from each set of twins, whereby they are both asked questions relating to their twin to ensure a more accurate collection of education data. The problem of measurement error in the schooling variable needs to be addressed as it could cause a downward bias in the returns to education estimate (Griliches, 1977).

The measurement error is exacerbated when the first differenced equation is used (i.e. equation (3.24) or (3.25)). The element that we have concerns for is the schooling variable, i.e. ($S_{i1} - S_{i2}$). Therefore, the response to Ashenfelter and Krueger's additional question obtained from each twin member allows the following to be calculated.

$$\Delta S_i' = S_{2i}^2 - S_{1i}^1 = \Delta S_i + \Delta v_i' \quad (3.26)$$

$$\Delta S_i'' = S_{2i}^1 - S_{1i}^2 = \Delta S_i + \Delta v_i'' \quad (3.27)$$

$$\Delta S_i^* = S_{2i}^1 - S_{1i}^1 = \Delta S_i + \Delta v_i^* \quad (3.28)$$

$$\Delta S_i^{**} = S_{2i}^2 - S_{1i}^2 = \Delta S_i + \Delta v_i^{**} \quad (3.29)$$

where ΔS_i indicates the true schooling difference and Δv_i represents the measurement error. These 4 equations in Rouse (1999) are based on the classical measurement error[28] model introduced in Ashenfelter and Krueger's 1994 paper.

The instrumental variable (IV) method is used to obtain the estimates of the returns to education, the β estimate. Equation (3.26) shows the true schooling difference as that reported by twins on their own level of schooling. The error in this method of reporting is "corrected" using equation (3.27). In equation (3.27), the true schooling difference is based on the reporting of each twins' level of schooling by his or her sibling. Hence, equation (3.27) will be used as the IV for equation (3.26). Equation (3.28) and equation (3.29) are used to control for any error that may be present in the reporting of a single member in the twin pair or what Rouse terms as the person-specific error. Therefore, we will find that when equation (3.29) is used as an IV for equation (3.28), the true schooling difference is the difference in schooling levels reported by themselves of their own schooling and that as reported by his or her twin.

Reliability ratios are also derived to indicate the levels of reliability of the additional information collected from the twins. The reliability ratio is the ratio of the variance in the true level of schooling to the variance in the reported measure of schooling. This

[28] The measurement error is classical when the independent variable is uncorrelated to the measurement error in the instrument and uncorrelated with the true level of schooling.

reliability ratio would be able to give us an indication of the magnitude of biasness in our schooling coefficient. In Ashenfelter and Krueger's study, 8 to 12 percent of the measured variance in schooling was found to be due to measurement error in the schooling variable.

3.3.2.1.2 "Pay" as the dependant variable.

The dependant variable in the earnings function is usually the earnings that are reported at a point in time. Theoretically, this "pay" should be permanent earnings, earnings that include fringe benefits and all other aspects of pay. However, we will find that most of the time, we are not able to consider the other aspects of pay due to the lack of data. With the omission of significant perks, the estimate of the coefficient on the various independent variables may be underestimated. Recognising that this omission may be unavoidable, appropriate caution would need to be exercised when interpreting results derived from data that lack full details.

3.3.2.1.3 Education

Another issue raised is the measurement of education. The education variable is usually measured by the years of schooling that an individual has taken. One shortcoming of this method is that it does not take into consideration the quality of education[29] or if education

[29] Jones (2001) quoting Berhman and Birdsall (1983) alerts economists/researchers utilising the earnings function when applying it to developing countries to be aware that biases arising from the omission of school quality control could have an impact on the earnings equation.

that is received relates to studies in arts, social science or other faculties of studies. This problem however, can be overcome by including additional variables on the right hand side of the earnings function which proxy these qualitative aspects (Sapford and Tzannatos, 1993).

A second shortcoming is that the regression coefficient on schooling represents the rate of returns on an incremental year in excess of average schooling. This assumption does not allow for the actual return to those who have 2 or 12 years of schooling to differ. To rectify this problem, as mentioned at the beginning of this section, dummy variables could be inserted to depict the level of schooling or qualification dummies could be used to depict completion of levels of schooling.

Other than inserting dummy variables to replace the schooling variable, a quadratic schooling term can be used. This quadratic schooling term would have similar interpretation properties as the experience-squared variable. Using the *quadratic* schooling term, S_i^2, the basic earnings function is modified as follows: -

$$\ln Y_i = \alpha + \beta_1 S_i + \beta_2 S_i^2 + \gamma_1 EXP_i + \gamma_2 EXP_i^2 + \varepsilon_i \qquad (3.30)$$

Equation (3.30) indicates that there is a declining marginal rate of returns to schooling as the years of schooling rises. One would expect the marginal rate of returns to schooling to diminish the older (or more experienced) the individuals (Polachek and Siebert, 1993).

Third, informal education is not taken into consideration in the schooling variable. This is a variable, which is difficult to quantify, and so far, there has been no study that introduces this aspect of education into the regression analysis.

3.3.2.1.4 Should other variables be included?

From the various issues raised, the question that then arises is *"Should other variables be included?."* This can be questioned as earnings may vary not only by education level and experience but also by type of work or sector and region of employment. By omitting these differences, there may be a bias in the estimated coefficients of schooling and experience. Therefore, one may be tempted to include any available occupational, industrial and regional variables along with the standard earnings influencing variables.

Another reason that would tempt one to include these other variables is the low reading of R^2 or adjusted R^2 in most human capital earnings function regression result. This R^2, as we know, is the coefficient of determination and it is a summary measure that tells us how well the sample regression line fits the data. Or, in simpler terms, the R^2 measures the proportion or percentage of the total variation in the dependent variable that is explained by the regression model. We also know that R^2 lies between 0 and 1, the closer it is to 1, the better the fit. However, in most empirical studies using the human capital earnings function, the R^2 obtained is usually low. Citing a multi-country data study by Ram (1996), the R^2 obtained ranged from –0.04 (for the low income LDC sample) to 0.31 (R^2

obtained for the middle income LDC sample). Other studies[30] indicated similar ranges of R^2 obtained.

The inclusion of other variables could increase the R^2 readings to improve the goodness of fit of the regression. However, according to Sapford and Tzannatos (1993), this practice is objectionable on theoretical grounds because it denies the competitive framework from which the earnings function is derived. Although it cannot be denied that wages or pay does play a role in the decision that a person makes on whether to accept the job/occupation offered but the occupation itself could exert an independent effect (Polachek and Siebert, 1993). This is argued on the grounds that different occupations carry different rewards, especially in terms of the non-pecuniary rewards. The latter explanation involves the concept of 'equalising wage differentials' or the 'compensating differentials' where wage rates adjust to compensate for the differences in the characteristics of the job/occupation. Hence, if we included an occupational status variable, this variable could bias the estimated effects of other variables, including the returns to education.

[30] Hoerr's (1973) study on Malaysia indicated a R^2 of 0.62 while in Indonesia (Deolalikar, 1993) obtained a R^2 of 0.46. A study by Vaillancourt (1995) for Canada obtained R^2 values of between 0.11 to 0.41.

3.3.2.1.5 Is education only good on paper?

The last issue that we would like to consider in relation to the human capital earnings function is the screening hypothesis. The screening hypothesis suggests that individuals take up education to obtain "pieces of paper" which would help the holder get a better-paid job (Sapford and Tzannatos, 1993). This hypothesis is in contrast with the human capital approach, which the earnings function depicts, whereby with investments in education, the worker's productivity will be augmented, hence leading to higher earnings. The theoretical implication of the screening hypothesis is that the social pay-off of investments in education might be minimal (Sapford and Tzannatos, 1993). Screening by employers occurs due to market failure as employers are faced with insufficient information to help them in their employment decision.

An early attempt made to measure the screening hypothesis was by Taubman and Wales (1973). Taubman and Wales divided their sample into three categories of occupation. They were categorised into the professional, sales and technical category, the managers and owners category and the blue collar, white collar and service occupation category. The actual distribution of people with their different levels of education was obtained according to the three occupational categories. They then compared these actual occupational distribution figures with the expected occupational distribution. This latter so-called free entry figure was estimated based on the assumption that each individual will select the occupation category in which his income is the highest.

Taubman and Wales examined the difference between the actual and expected figures and found that under the free entry assumption, very few people would have opted for the blue collar, white collar and service occupation category. They found that a higher number of those with lower educational attainment (i.e. high school qualification) would enter this occupational category while estimated occupational distribution figures indicated higher number of these candidates with lower educational attainment into the technical and sales occupation category. Taubman and Wales concluded that the results could be an indication of educational credentials being used as barriers to entry.

Using the earnings differentials based on their actual and estimated occupational distribution, Taubman and Wales concluded that that the private rates of returns to education are only about half to two-thirds of its estimated value. It indicated that without screening, the returns to education would be lower than the estimated values.

Typical of most empirical work, these values estimated by Taubman and Wales were queried. The argument raised was associated again with the measurement of ability and the appropriateness of these ability measurements. Layard and Psacharopoulos (1974) hinted at the idea that the screening hypothesis could well be discrimination between individuals. The failure to provide concrete support to Taubman and Wales' findings and not withholding the fact that the screening hypothesis is an important issue with the education and wages/earnings phenomenon, Layard and Psacharopoulos presented three pieces of evidence suggesting that screening is not a major part of the earnings explanation.

Firstly, the rate of returns for dropouts are as high as for those who complete a course, which refutes the sheepskin version (i.e. schools producing pieces of paper to help the holder get a better job) of the screening hypothesis.

Second, standardised educational differentials rise with age, while a reasonable version of the screening hypothesis would lead one to expect a fall. The screening hypothesis claims that high wages are paid to those who possess more education and hence, the effect of this education obtained should decline as age increases considering that employers would by then have had a chance to evaluate an employee's productivity level. However, evidence from Layard and Psacharopoulos's paper indicates that the effect of education on earnings increased as age increased.

Third, if screening is the main function of education it would probably be done more cheaply by testing and other means, and certain testing agencies or bodies would have developed to reap the very large profits that could be made by doing this. Layard and Psacharopoulos concluded that pending further work, the theory of human capital is far from being discredited.

The screening hypothesis has continued to be an issue within the area of economics of education and recent studies have utilised one of the following tests to examine the role of education in the labour market.

Psacharopoulos Test (P-test)

The P-test derived by Psacharopoulos (1979) analyses if the strong version or the weak version of the screening hypothesis exists in a particular country. The strong version of the screening hypothesis does not recognise education as a productivity-enhancing tool and believes that schooling or education is solely used as a signal. On the other hand, the weak version states that education may also augment inherent productivity in addition to carrying the primary role as a signalling tool for employers. Therefore, according to the weak version, employers are inclined to offer a higher starting salary to the more educated workers as compared to the less educated workers (Arabsheibani and Rees, 1998). In order for the strong version to hold, this difference in salary will be maintained even after the employer has had a chance to observe the employee's true productivity.

The P-test requires researchers to divide their samples into two categories of workers. The two categories of workers are those in the competitive sector (usually associated with the private or non-state sectors) and those in the non-competitive sector (namely the public or state sectors). The earnings function[31] is analysed for these two categories of workers separately. It is claimed that the former sector would place emphasis on a worker's productivity levels compared to that placed by the non-competitive sector. The P-test advocates that if the rate of returns to education is higher for a sector or a group of people where productivity matters (i.e. the competitive sector) than the other group analysed (i.e. the non-competitive sector), it can be deduced that the weak version of the screening hypothesis plays a stronger role than the strong version of the screening hypothesis.

In addition to this, the results of the P-test would need to be accompanied by the examination of the mid to early career earnings ratio. In the weak screening hypothesis, employers would use education as an initial screening tool. As employers obtain more information on their workers through on-the-job observations, wages will be adjusted according to their productivity levels. In line with this, as years of schooling increases, we would expect the mid to early career earnings to increase (on the basis that the more educated has higher productivity levels).

[31] The earnings function used is a simple earnings function containing the number of years of schooling as a measure of human capital along with the experience variables. In Psacharopoulos original paper, he had also controlled for the individual's number of hours and weeks worked.

In the 'clash' between the weak and strong, the majority of the studies find that the weak version of the screening hypothesis is the 'stronger' contender (Arabsheibani and Rees, 1998; Magoula and Psacharopoulos, 1999 and Clark, 2000).

Wolpin Test

In the Wolpin (1977) Test, the earnings function[32] is also estimated for two groups of individuals. They are the unscreened and screened groups. In this test, the unscreened group comprise the self-employed while the screened group of individuals are those who are employees or salaried workers. Wolpin stands by the argument that the self-employed individuals are more certain of their future employment path and are therefore less likely to take up schooling for motivations other than as human capital investment.

If the results of the Wolpin test show that the employed or salaried workers (screened group) to have higher returns to schooling compared to the self-employed group (the unscreened group), then one can deduce that education does have a screening role. The intuition behind this method of deduction arises from the believe that the salaried person will take up education knowing that it will enhance their productivity level and function as an informational tool to their employers. This suggests that the salaried person would expect a high return to the education that he or she has invested in.

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[32] Similar to the P-test, the earnings function in the Wolpin test utilises the number of years of schooling as a measure of human capital, controlled for ability and experience.

On the contrary, the self-employed person is only motivated to take up education as a productivity-enhancing tool and does not need to use it as a signal of his abilities. Given this belief, we would expect the self-employed person to have a lower return to education. Empirical work using the Wolpin test includes Grub (1993) and Cohn et al. (1987)[33]; Brown and Sessions (1998, 1999[34]) and Clark (2000). These studies have found evidence to support that education plays a dual role of providing information to employers and also as a productivity-enhancing tool.

Liu and Wong Test.

The two screening hypothesis tests that we have discussed above uses the years of schooling as a measure of human capital in the earnings function. In the Liu and Wong (1982) test,[35] this measure of human capital is complemented with certificates gained.[36] This is done based on the argument that employers are not only concerned with the number of years of schooling that an individual has undertaken but are also interested in the qualification or certificates that have been obtained.

Liu and Wong note that employers are required to make two decisions in the employment process. Employers are firstly required to decide if they will hire the potential candidate

[33] As quoted in Clark (2000).
[34] The results in the papers by Brown and Session indicating support for the weak screening hypothesis appear to hold after considering self-selection issues.
[35] The screening effect here is also known as the sheepskin effect.
[36] By doing this, the assumption of linearity in the earnings equation no longer holds.

and once they have taken this decision, they would need to decide on how much to pay the newly hired employee (the wage offer decision). Liu and Wong argue that the number of years of schooling could influence the hiring decision but finer attributes of the employee's educational achievement are needed for wage screening purposes.

Liu and Wong examined the Singaporean case to reason that certificates are used for screening purposes by firms because educational certificates have a positive correlation with an individual's level of productivity. The marginal cost of acquiring a certificate is lower for the more able individual. They also believe that the education certificate obtained is an indication of the quality of schooling that an individual has invested in. Finally, given the fact that educational certificates are obtained through public examinations, this means that there is no costs accrued to firms that take advantage of the information carried by the educational certificates.

In the Liu and Wong screening hypothesis test, four propositions are examined.

- The effect of certificates on relative wages decreases with years of experience.[37] The result from testing this proposition will confirm if education does have screening properties.

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[37] Liu and Wong's empirical work using data from Singapore indicates that the returns accrued to education measured by the certificates obtained decreased as tenure in the firm and experience in the labour market increased

- The importance of wage screening may be greater for high-level certificates than for low-level certificates.[38] This stems from Liu and Wong's perception that the skills of those with higher levels of education will take a longer time to take effect.
- Wage screening by certificate continues to be used by firms even for individuals who have had previous work experience.[39] This proposition stems from the notion that employee information is not shared among firms in the labour market.
- The effect of years of screening on relative wage need not decrease with years of schooling.[40] The purpose of testing this proposition is to show that employers require more information before they are able to determine the level of wages to offer to their newly hired employee.

Application of the Liu and Wong type of testing can be seen in Patrinos (1996), Park (1999), Clark (2000), Antelius (2000) and Denny and Harmon (2001).

[38] Screening effects persist longer for higher level of certificates obtained. Liu and Wong discovered that at the primary school level, screening did not take place while at the high school level, on the job screening took effect after two years of tenure in the firm. For individuals with higher levels of certificate, the effects of screening via certificates was phased out only after four years of observation of job performance in the firm.

[39] Employee information is not shared with other firms in the labour market. Liu and Wong find that when an individual switches jobs, certificates obtained continue to be used as a screening device.

[40] The returns to an additional year of schooling were found to increase over time in Liu and Wong's empirical results. This indicates that the relative wages of the more productive individual increases relative to the less productive individual.

3.3.2.2 The Heckman Procedure

Having discussed some of the issues related to the human capital earnings function, we will now look at some of the procedures taken to improve the estimates obtained from using the human capital earnings function for analysis. The Heckman procedure (Heckman, 1979) is usually associated with the concept of selection. The concept of selection occurs when the sample available for estimation is selected either directly or indirectly according to the value of the dependant variable. Sample selection bias may arise in practice for two reasons. First, there may be self-selection by the individuals or in the data units that are being investigated. Second, sample selection decisions by the analyst or data processors operate in much the same fashion as self-selection.

Econometrically, if we estimate equation (3.10) or (3.11)[41] by the *Ordinary Least Square* (OLS) method, we will find that the estimate of the beta coefficient(s) will be biased. The problem with the OLS is an omitted variable bias due to the failure to include the non-zero conditional expectation of the error in the regression. This arises from our use of a randomly selected sample, which contains those who may have made a decision not to participate in an event due to various factors that cannot be observed. When estimating the rate of returns to education, the women sample is said to suffer from selection bias. This argument is usually used on women as a woman is said to be able to make a choice

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[41] $\ln Y_i = \alpha + \beta S_i + \gamma_1 EXP_i + \gamma_2 EXP_i^{\,2} + \varepsilon_i$ is equation (3.10) and $\ln Y_i = \alpha + \beta_1 PRIM_i + \beta_2 SEC_i + \beta_3 VOC_i + \beta_4 UNIV_i + \gamma_1 EXP_i + \gamma_2 EXP_i^{\,2} + \varepsilon_i$ is equation (3.11).

to participate or not participate in the labour force. *Consequently, our estimation will not* represent the women who opt not to work. Another type of selection is the selection participation into training programmes. As the selection type suggests, such selection bias will affect the returns to training. This second example of selection could affect both men and women.[42]

The Heckman procedure was derived to solve this problem of selection bias. There are 2 stages to the Heckman procedure.[43] Our wage equation (which we can also term as the outcome equation) is as per equation (3.10). Let us rewrite this equation for the purpose of explaining our sample selection correction using the Heckman Procedure.

$$\ln Y_i = X_{1i} + \epsilon_1 \tag{3.31}$$

where one of the variables in the X_i vector is schooling.

The problem with equation (3.31) is that we can only observe wages for women who are working. Our estimated coefficient is biased by our failure to include those not participating in the labour force. In the first stage of the Heckman procedure, we

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[42]Jones (2001) notes from her analysis on Ghanaian data that when using an earnings function for developing countries, the majority of the labour force is employed outside the wage sector. Hence there is the possibility of an exacerbated sample selection bias issue (Vivjerberg (1993), Bennell (1996), Glewwe (1996), Jolliffe (1998) as quoted in Jones, 2001).

[43] This Heckman 2-step procedure should not be confused with the Two-Part model (TPM). The fundamental difference between the Heckman 2-step and the TPM lies with the assumptions made on the error terms in the models. Manning et al. (1987), Leung and Yu (1996) and Heckman (1990), amongst others have discussed some of the issues surrounding the debate between the TPM and the 2-step Heckman method.

determine the likelihood of our women participating in the labour force by carrying out a probit analysis on the following equation.

$$LFP^* = \mu' X_{2i} + \epsilon_2 \qquad (3.32)$$

where LFP^* is a latent variable measuring labour force participation, such that $LFP^* > 0$, if an observed labour force participation measure, LFP=1 (is a labour force participant) and $LFP^* \leq 0$, when LFP=0 (is not a labour force participant). X_2 is a vector of the determinants of labour force participation and ϵ_2 is the error term.

When executing equation (3.32), there is a need to ensure that $X_1 \neq X_2$. There should be at least one variable (i.e. the identifying variable(s)) in X_2 that can be excluded from X_1.

In the second stage, the probit estimator obtained in the first stage is used to compute the Inverse Mills Ratio (IMR), λ_i, which is appended as an additional regressor to the wage equation to obtain selection bias-corrected parameter estimates using data on workers only.

$$\lambda_i = \frac{\phi(X_{1i}\hat{\beta}_i / \sigma)}{\Phi(X_{1i}\hat{\beta}_i / \sigma)} \qquad (3.33)$$

where $\phi(X_{1i}\hat{\beta}_i / \sigma)$ is the standard normal probability density function and $\Phi(X_{1i}\hat{\beta}_i / \sigma)$ is the standard normal cumulative probability density function.

The IMR is interpreted as an estimate representing the effects of the unobserved factors such as motivation and ability in the wage equation. The IMR is what we could term as the correction factor. If we obtain a positive and statistically significant IMR coefficient in the wage equation, selection bias exists (from the significance of the IMR). Such result would suggest that the group of persons analysed (for instance, females) who have actually chosen to participate in the labour market earns higher wages then randomly assigned persons (Brunello, et al., 2000).

The Heckman procedure, which is also known as a limited information maximum likelihood (LIML) method has been widely used in many studies of which some of the results will be reviewed in the next chapter. The alternative to this 2-step Heckman procedure is the full information maximum likelihood (FIML) method such as the Tobit models. However, the FIML method can be computationally costly and this appears to have allowed the Heckman procedure to be given preference.

However, when using the Heckman Procedure, caution has to be taken given the criticism attached to this method. In the mid-1980s, the Heckman procedure was criticised for its identification and non-normality problems (Leung and Yu, 2000). These issues prompted the development of semi-parametric models to estimate the sample selection bias. In semi-parametric models (see for example, Martins (2001) for an application of this model), the assumption of normality is relaxed. This is to avoid the consequences of making the wrong assumption on the unobservable error terms. In the Heckman model, ϵ_1 is assumed to be normally distributed.[44]

The more recent criticism of the Heckman procedure has prompted Monte-Carlo studies such as that conducted by Nawata (1993, 1994) and Leung and Yu (1996,2000). The problem raised is one that involves the issue of multicollinearity in the Heckman procedure. Puhani (2000) surveyed the various Monte-Carlo studies, which have examined this issue of multicollinearity in the Heckman procedure. The results of the Heckman procedure are said to be flawed when and if there is a high correlation between the error terms, ϵ_1 and ϵ_2 in equation (3.31) and (3.32). The Heckman procedure model is unstable when X_1 and X_2 are highly correlated. If high correlation does occur between the two sets of variables, the IMR obtained in the second stage of the Heckman procedure becomes problematic, especially when the IMR is correlated to X_1 (Leung and Yu, 1996).

In the most recent Leung and Yu (2000) paper, the authors had systematically presented another round of analysis and argument on the issue of multicollinearity in the Heckman procedure. Although the FIML method is now feasibly available as an alternative to the Heckman procedure (which is a LIML method), researchers should not rush into rendering the Heckman procedure redundant given the collinearity problems. Leung and

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[44] $(\varepsilon_1, \varepsilon_2) \sim BVN\left[\begin{pmatrix}0\\0\end{pmatrix}\begin{pmatrix}\sigma_1^2\sigma_{12}\\ \sigma_{12}\sigma_2^2\end{pmatrix}\right]$

Yu note that the FIML methods are not immune to problems and can still be expensive to compute, especially in large sample estimation and when the number of parameters is large. Leung and Yu present three reasons urging researchers not to sideline the Heckman procedure. These three reasons are: -

1) There is evidence that the 2-step Heckman method is more efficient than the FIML in small samples.
2) The two-step Heckman estimates also tend to have smaller parameter bias compared to the FIML estimates in small samples and
3) The 2-step Heckman method is more robust than the FIML and is generally found to be more efficient when the dependent variable of the outcome equation is measured with error.

A useful discussion in this Leung and Yu paper is the examination of the root of the multicollinearity problem. They note that 2 conditions must exist in order for multicollinearity to be present. The problem lies with the IMR term. Collinearity problems are present when the IMR is a linear function and when X_1 and the IMR are highly correlated. Both these conditions must exist together in order to deem the Heckman procedure inappropriate. If only either one of the 2 conditions appear, the Heckman procedure is still a valid method, in fact one that is more efficient than the FIML method.

3.3.2.3 Instrumental Variables

Another problem that economists and researchers often face is the issue of endogeneity when estimating relationships between different variables. The problem lies in the ordinary least square (OLS) estimate, which is said to be inconsistent because the independent variable is correlated with the error term.

An example of such a case is the quality of school, where the better quality schools will see students continuing their education and have an effect on the returns to education (See Case and Yogo, 1999). Another example where the issue of endogeneity could be raised is that analysed in Angrist and Krueger (1991) whereby law on compulsory schooling had an impact on the returns to education. Another example is in Card (1995)'s study whereby he had used proximity to college as an inducement to college attendance, i.e. closer proximity to college could lower the cost of a college education, thus encouraging those who live nearer to colleges to attend.

To correct for endogeneity, researchers/economists have attempted to use the instrumental variable (IV) estimation to eliminate the bias caused by the correlation between the independent variable and the error term. The 'instruments' used are variables which are thought to have no direct association with the outcome and would preferably be highly correlated with the variable that is said to be correlated with the error term, in this case the education variable. When the instrumental variables are identified, the two stage least square (2SLS) regression is used to estimate the coefficient on education. As the term suggests, there are two stages to this estimation. To illustrate this method, we present the earnings function (without the ability measure) again.

$$\ln Y_i = \alpha + \beta S_i + \gamma_1 EXP_i + \gamma_2 EXP_i^{\ 2} + \gamma_3 X + \varepsilon_i \qquad (3.34)$$

The problem lies in S and ε_i. They are correlated, if for example, we have omitted variables (such as ability, family background or other unobservable variables) that are said to bias the OLS estimated coefficient on S, β. If there is sample selection bias, β is not the rate of returns for a *randomly selected sample. The rate of returns* from a randomly selected sample is one that can represent the population but the argument that we are addressing here states that we are estimating the rate of returns for those endowed with 'ability' lodged endogenously in the model.

In using the IV method to solve for the endogeneity problem, we need to identify instruments, which are firstly not correlated with ε_i and secondly are correlated with S. Having identified the appropriate IV(s), the 2 stages of 2SLS are as follows, assuming that the IV identified is W_j: -

Step 1 Obtain OLS predictions from regressing S on W_j.

$$S_i = \alpha + \delta W_j + v_i \qquad (3.35)$$

where v_i is the error term.

Step 2 The predicted values taken from step 1 are used in place of S_i of equation (3.34) by OLS.

To embellish further, Angrist and Krueger (1991) applied the IV method as an attempt to gauge for the impact of compulsory schooling on earnings by using quarter of birth as an instrument for education. The reason for examining this impact is that with the compulsory schooling law, those born in a certain month of the year would have to attend school longer than those born in another month. Thus, returns for those compelled to stay in school could well be higher compared to those *who do not stay on in school*. *This* paper represents the endogeneity problem linked to the schooling variable.

The following 2SLS model was estimated in Angrist and Krueger's paper. In the first step, the following equation was estimated.

$$E_i = X_i \pi + \Sigma_i D_{ic} \delta_c + \Sigma_c \Sigma_i D_{ic} Q_{ij} \theta + \varepsilon_i \qquad (3.36)$$

Where E_i is the education of the ith individual, X_i is a vector of covariates, Q_{ij} is a dummy variable indicating whether the individual was born in quarter j (j=1,2,3), and D_{ic} is a dummy variable indicating whether the individual was born in the year c (c=1,....,10). In the second step of the 2SLS, equation (3.37) was regressed using the OLS method.

$$\ln Y_i = X_i\beta + \Sigma_c D_{ic}\, \xi_c + \rho\, \hat{E}_i + \mu_i \qquad (3.37)$$

Where Y_i is the wage[45] and the coefficient ρ is the returns to education. In the second step, the education variable $\hat{E}_i$ is identified by the variation in education across quarters of birth within each birth year. If quarter of birth were indeed an appropriate instrument, the coefficient on $\hat{E}_i$ in equation (3.37) would then be a consistent estimate of the returns to education[46], which is representative of the population.

However, following this study, Bound et al. (1995) cautioned that problems could arise from using IVs to attempt to correct for endogeneity in the education variable. They show that 2 problems could arise if the IVs are not carefully chosen. The IV estimate could be inconsistent even if a weak relationship exists between the instrument and the error term. When this occurs, the finite-sample advantage of obtaining a reduced bias on the estimate coefficient will be affected. They note that in finite samples, IV estimates could be biased in the same direction as the OLS estimates.[47] Bound et al. went on to note that good and valid instruments are difficult to find.[48]

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[45] In the Angrist and Krueger study, weekly wages were used.

[46] In the Angrist and Krueger study, the OLS and 2SLS estimates did not appear to be statistically different. Based on this finding, Angrist and Krueger concluded that there is little bias in using the conventional OLS to estimate the returns to education. This finding will be re-examined again in the next chapter.

[47] Bound et al. illustrated these problems by re-examining Angrist and Krueger's study using IV estimates. The found evidence that despite having used large sample size, Angrist and Krueger's findings suffered from finite sample bias and may be inconsistent as well.

[48] Other studies that have used the IV method to estimate returns to education are amongst others, Kling (2000) which used college proximity as the IV and Butcher and Case (1994). In the latter study, Butcher and Case suggested that knowledge of family structure (i.e. sibling sex composition) could be potential instruments for the IV method. Card (2000) summarises the results of 11 recent studies (dating from 1991 to 1999) that have used the IV method to estimate the returns to education.

Nevertheless, this word of warning should not discourage researchers from using this method to solve for endogeneity but at the same time, endogeneity does not render all estimates useless. Connelly, et al. (1998) notes,

> "We urge researchers not to assume that endogeneity is a fatal error. In a world in which good instruments are rare, and bad instruments and omitted variables can cause more problems than they cure, sometimes the assumption of exogeneity is the lesser of three evils. The notion of trade-off must be accepted in estimation strategies just as it is accepted in the world we seek to study. Instead of simply assuming that endogeneity invalidates a given estimation, researchers should think about the likely size of the bias."

When comparing the estimates obtained via the OLS and the IV method, the IV estimates are approximately 20 percent or more than that obtained via the conventional OLS method (see Card, 2000). The difference (magnitude wise) is caused by heterogeneity (raised by Card (1998) as quoted in Jones, 2001) whereby different sub-population have different characteristics, which are correlated with higher returns to schooling. Another explanation for the difference between OLS estimates and IV estimates is that researchers report only the results, which are statistically significant, and with the IV method, the coefficient on the IV variables must be larger to be statistically significant (See Jones, 2001).

3.3.3 Cost-Benefit Analysis

In the above section, we have presented the Human Capital Earnings Function and have also discussed some of the main issues that surround this method of estimating the rates of returns to education. In the next chapter, we will be able to see how this method has been put to use. We will also be able to see how the various issues raised in this section were tackled given the nature of the research and the data that were used. In this section, we will discuss the most complex method of calculating the rates of returns to education.

The most comprehensive methodology to calculate the rate of returns to education is the cost-benefit analysis, which allows us to obtain the Internal Rate of Return (IRR) to education.

> "The discounting of actual net age-earnings profiles is the most appropriate method of estimating the returns to education because it takes into account the most important part of the early earnings history of the individual."
>
> Psacharopoulos, 1994

Equation (3.38) is the core equation of the cost-benefit analysis.

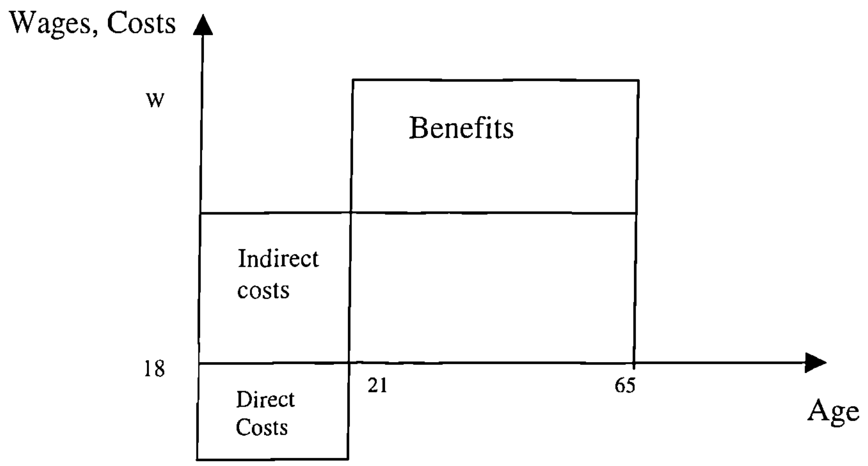
$$\sum_{t=0}^{n}\frac{B_t}{(1+r)_t}=\sum_{t=0}^{n}\frac{C_t}{(1+r)_t} \qquad (3.38)$$

B_t and C_t are the average benefits and costs of a particular educational investment in year t, n is the expected life of the investment and r is the rate of returns.

As highlighted in Tables 3.1 and 3.2, the various costs and benefits should be taken into consideration in order to derive the relevant private and social rate of returns to education. This framework equates the flow of benefits and costs to achieve the ideal "r," which is better known as the internal rate of return. The internal rate of return for education is the discount rate that makes the present value of education's income stream (i.e. benefits minus cost) equal to zero.

Figure 3.1 is to illustrate the benefits that may be obtained and the costs that will be incurred during the period of one's lifetime. In interpreting the results of the cost-benefit analysis, the IRR is compared to the returns obtained from the activity done should the person not pursue their education. If the IRR is higher than this return to the chosen alternative activity, then it can be said that it would serve the person better to invest in education than the alternative activity and vice versa. This stems from the opportunity cost concept that is a fundamental element in the study of Economics.

Figure 3.1: Costs and Benefits incurred over a person's lifetime.



In the cost-benefit analysis, deciding on the rate of discount that should be used for comparison proves to be a difficult task for many. Blaug (1970) notes that the task of selecting an appropriate rate of discount as a benchmark to the rate of returns calculated is a difficult one and with the various views from economists, this issue may well remain unsettled. However, it can be said that the rate of discount should be one that is reflective of the private or social investments in a country. In many studies, the rate of 10 percent is usually used as a yardstick by developing countries (Psacharopoulos, 1985).

Another possible drawback of this method is its data demanding nature. We must have sufficient numbers of observations in all age-earning level cells to be able to construct a well-behaved age-earnings profile (Moock et al., 1998). For instance, from Figure 3.1, we can see that benefits are accrued from the age of 21 to 65 years. We therefore would be required to have sufficient numbers of observation within each age group to give us a reliable measure of income that constitutes part of the benefits during this working period of a person's life cycle.[49] We must also assume that expected future earnings can be gleaned from cross-section data. In addition, there is a also a need to identify various variables such as externalities from education, non-pecuniary benefits and variables, which change over time such as inflation, mortality rates and unemployment rates.

[49] In a study of Canada, Vaillancourt (1995) based his study on 260,327 number of individuals with positive income.

The latter requirements are prevalent in the earnings function but what distinguishes the cost-benefit analysis from the earnings function is the amount of data and 'projections' needed in this full method.

3.3.4 Training?

In the discussion above, we have looked at the three micro approaches used to analyse the returns to education. Regardless of the method that is used, the ultimate result is to obtain a measure of the rate of returns to education from the data that we are able to utilise. We admit that the illustrations of the models have appeared to be education-biased as we have not given much attention to the element of training while the title of this chapter and the earlier parts of this chapter have talked much about training. One reason for this is that the majority of the studies that have used these models have been used extensively to gauge for the returns to education. This however does not mean that the returns to training cannot be measured using these micro models.

To incorporate the training element, we merely need to substitute or enhance each individual model to include the training element. For example, we could augment the basic human capital earnings function model to include the training element and have the coefficient on the training variable interpreted as the average returns to training. This could be in the form of the average years of the training programme or as depicted in equation (3.11), the returns to different levels of training could be gauged if such data are available (for example, different levels of vocational training).

In addition to this, we could also substitute the left-hand side variable of the earnings function to capture a firm's level of profits or productivity to investigate the impact of training on firm level profits and/or productivity.[50] Equation (3.39) allows for this firm level investigation.

$$\Pi_{it} = f\,(T_{it}, V_{it}) \qquad (3.39)^{51}$$

where Π_{it} is the distribution of profit and T_{it} is the number of workers trained and V_{it} is the error term representing the unobserved variables. Similar issues discussed in this chapter remain when the impact of training is gauged and some, for example the selection and endogeneity issues are important.

The determinants of training.

Other than attempts to measure the impact of training on an individual and/or firm, it is usual for economist to also determine the characteristics of those who are likely to train using information from their data set. When firm-level data is available, the researcher is then also able to determine the characteristics of firms who are likely to provide training to their workers. The determinants of training information could be used for two purposes. One, by being able to identify the characteristics of those who are likely to

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[50] Blundell, et al. (1999b) note, "There are numerous difficulty in measuring the returns to education and training for firms. In the first instance, it is extremely difficult to obtain data on firm productivity, competitiveness and profitability. Furthermore, there are problems in identifying empirical counterparts to the concept of general and specific training, and in identifying whether and how much of the costs are borne by workers or by employers."
[51] This equation has been adapted from Ashton and Green (1996).

train, we would be able to determine whether the inequality of access to training exist. Second, the probit model allows the sample selection procedure to be carried out. As noted in our discussion on sample selection, one believes that there may be an omitted variable when groups of people can be selected into training. For instance, the probit model investigation will allow a correction term to be gauged and this correction term can be inserted into the original OLS equation to improve the OLS estimated coefficient on training.

Probability models[52] (such as the probit and logit models) are usually used to carry out this type of investigation. In this section, we will present the probit model, which we have opted to use in our empirical analysis in Chapter 5 and 7. We have seen this model in section 3.3.2.2 under the heading the Heckman Procedure. We repeat it here with modifications made to show how the model is applied to training.

$$T^* = \mu X_i + \epsilon_1 \qquad (3.40)$$

where T^* is a latent variable measuring the implicit value of training, such that $T^* > 0$, if T=1 (a person who has participated in some form of training) and $T^* \leq 0$, when T=0 (a person who did not participate in training). X is a vector of the determinants of training and ϵ_1 is the error term.

[52] Maddala (1983) and Liao (1994) are comprehensive references for models of this nature.

The coefficients obtained from the probit model are interpreted as follows: a one-unit increase in the relevant variable will lead to a μ standard deviation increase in the predicted probit index.

3.4 CONCLUSION

This chapter provides an overview of the macro and micro approaches that allows economists to gauge the contribution of education and training in an economy and to an individual or/and firm. We have made an attempt to look into the various issues linked with the models derived.[53] Both the macro and micro approaches have their individual econometric problems and in most cases, possible solutions are available.

At the macro level, the production function is mainly criticised for being an inconsistent model whereby the results can differ depending on the data set used even when applied to the same country and time. This makes the results at the macro level somewhat unbelievable and hence raises doubts among certain groups of growth economists.[54] On the other hand, issues surrounding the micro approach (which is mainly centred on the earnings function, based on the emphasis of this chapter) such as the sample selection bias

[53] We admit that the micro approaches have been given more attention. We have done this in line with the theme of the thesis, which is focused at the micro level.
[54] In Keynesian theory, the growth of inputs is a derived demand from the growth of output, and the task is to explain why output grows faster in some countries than others in terms of the components of autonomous demand - investment, government expenditure, exports, and so on and not a supply side phenomenon as the production function would advocate.

and measurement error bias taint the analysis at the micro level. The biases are one of the few factors that have caused scepticism among economists working on educational issues in developing countries. In the next chapter, we will look into studies that have analysed the biases in detail and the findings from some of these studies appear to indicate that the two biases are balanced out, whereby the upward bias of the ability variable is offset by the downward biased found when measurement errors are present.

The mind-boggling matter between the two approaches that is faced by economists is to explain why the macro evidence does not appear to support evidence found at the micro level.[55] We will see the difference in the macro and micro results in the next chapter. The micro results will generally display a higher return to education compared to the returns that are measured at the aggregate level. Jones (2001) offers an explanation for the lack of linkage between the macro and micro studies. The explanation is while education and earnings have a strong correlation, education and productivity (measured as GDP) does not. Hence, the positive private returns to education to the individuals reflect the former and the latter explains why human capital has a smaller impact on aggregate productivity.

In an earlier paper by Krueger and Lindahl (1998), this explanation provided by Jones is expounded. Krueger and Lindahl show that the inconsistency problem between the micro

[55] All micro studies have found positive impacts of education and training on an individual and firm, as we will see in the next chapter, with an exception of one study by Goux and Maurin (2000).

and macro model results appeared to lie with the aggregated data used in the macro models. Measurement errors in the schooling variable seemed to be the main cause of inconsistency in the macro and micro models. Another source of inconsistency had also involved the inclusion of capital growth in the macro models. The findings in Krueger and Lindahl's paper had also provided the impression that it may be more beneficial to examine the effects of education at the individual country level as each country's educational system differed and therefore universal results (from cross-country level studies) may not be appealing. We will examine the Krueger and Lindahl findings in further details in the next chapter.

From the issues discussed in this chapter, it would appear that the quality of data has a sizeable effect on the application of these models, which measures the effect of human capital as an economy develops. At the micro level, natural experiments have helped overcome the measurement error problem in the schooling variable. However, at the macro level (especially in cross-country level studies), the results continue to be plagued by the quality of data that is available. Given the current state of research, it would appear that the results estimated using the micro models (which we will apply in this thesis) could well be more robust and stable than those estimated using the macro models, especially for developing countries where data is generally of a lower quality in nature.

Amidst these controversies, we however cannot deny that these models have helped economists to conceptualise the role of education and training at both the macro and micro level. Human capital will continue to exist and grow for as long as population and mankind exist. Therefore, the need to further understand and improve the measurements of human capital contributions at all levels will need to continue. Due to this reason, "new" models or methods of estimation will continue to surface (See Moffit, 1999). At a policy making level, the interpretation and understanding of the findings may well be more important. It should be recognised that current norms, customs and certain socio-political configurations could dictate the contents and form that education takes in different places at different times.

The next chapter will present the literature review of these results and will discuss the various ways that these models presented here in this chapter have been applied.

CHAPTER 4

EXISTING EVIDENCE ON EDUCATION AND TRAINING AND THE ECONOMY

4.1 INTRODUCTION

Our discussion in the previous chapter concentrated on the economic models, which can be used to measure the role of human capital and its contribution to an economy at both the macro and micro level. This chapter will focus on reviewing the findings of various empirical studies linking the human capital variable with economic growth and also those that have estimated the returns to investments on human capital. This chapter will not only provide an overview of the literature that is available in this area but will also look into the implications that these findings may have on Malaysia.

Following this action, we will find that a set of questions could be raised pertaining to the education and training situation in Malaysia. In order to find answers to these questions, it would be necessary to then review the education and training studies that have been conducted for Malaysia. After reviewing these studies, we find that there is indeed an information gap, which needs to be filled in for us to be able to identify the role of the human capital factor in the economic development of Malaysia.

This chapter will be divided into the following sections. Section 4.2 will focus on discussing the empirical findings of studies conducted at the macro level while section 4.3 will look into studies that have analysed the impact of the human capital factors on the individual, i.e. the rate of returns to education and training studies conducted in other countries. In this section, we will attempt to concentrate on studies, which have been conducted in developing countries. Section 4.4 will look into the implication of the existing evidence with reference to Malaysia. Section 4.5 will discuss the results from existing studies on education and training in Malaysia and section 4.6 will summarise this chapter and section 4.7 will conclude.

4.2 EDUCATION, TRAINING AND ECONOMIC GROWTH.

The general view of economists who have conducted research into the human capital factor on economic growth is that increased levels of human capital leads to either increased growth rates or increased levels of per capita income. The development in the methodology (as shown in the previous chapter), which has led to this generalised view, began in the 1960s with standard sources of growth based on the dynamic Cobb-Douglas aggregate production function. The basic equation incorporates growth measured as GDP per capita or GDP per worker as a function of labour and capital. The model is then extended to include the human capital variable as an input to production. Studies utilising this method include, amongst others, Lau et al. (1993), which found that one additional year of average education per person of the labour force increases real output by approximately 20 percent and Tilak (1990), where results had indicated that education contributed positively to economic growth in China.

In 1988, Lucas pointed out that the human capital used in the Cobb-Douglas production function could act as an engine of growth whereby *"human capital is simply an unobservable magnitude or force, with certain assumed properties.."*. Lucas (1988) shows evidence that the contribution of growth is not only confined to human capital which is accumulated through schooling but also draws our attention to a model which emphasises human capital accumulation through learning by doing.

After this study by Lucas, we see the emergence of the new growth theory of the 1990s. This new growth theory touches on the indirect contributions of human capital and refutes the assumption that there are decreasing returns to human capital used by the growth accounting method.

The new growth theory shows that growth results from the usage of the four inputs, i.e. capital, labour, human capital and technology. At the outset, this specification is similar to that used in the Cobb-Douglas production function discussed above and in Chapter 3. However, in this new growth theory, there is an endogenous element. This endogenous element (referring to the idea that growth can be spurred from within the model or within an economic system) is the technical change, which is seen as an exogenous variable in the Cobb-Douglas production function. Romer (1990) invokes the new endogenous growth theory whereby he draws attention to technical change occurring when the stock of human capital is improved or increased. This effect will subsequently increase the economic growth of a country. Aside from introducing the endogenous effect of the human capital stock, Romer also notes that growth can be encouraged via direct investment in research. He also finds that open trade can be a source of technical change and growth.

Studies such as that conducted by Barro (1991) provide support for the new endogenous growth theory. The role of human capital is a facilitator to improvements in total factor productivity (TFP). Barro (1991) notes that *"rather than (or as well as) entering as an input into production, the level of human capital affects growth by facilitating improvements in total factor productivity via 'imported' technology"*. Other studies, which have expanded the endogenous growth model,[56] are, amongst others, Levine and Renelt (1992), Levine and Zervos (1993) and Otani and Villanueva (1990).

In general, the evidence indicates that human capital has a positive impact on economic growth regardless of the model that is used. The studies (mainly cross country studies),[57]

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[56] The initial level of human capital is usually inserted into the right hand side of the growth equation and the results indicate a positive coefficient on this variable. In equations where the initial level of per capita income is included as an independent variable, researchers use the coefficient on this variable to examine the issue of convergence where it is believed that poor countries are able to catch up with rich countries.
[57] Cross country studies became popular after the designing of panel data sets such as that created by Summer and Heston, Barro and Lee and so on (See Temple, 1999a).

which emerged later following the introduction of the new endogenous growth theory, were papers (See amongst others, Mankiw, Romer and Weil (1992) and Gemmell (1996)) debating on the "true" role of human capital in relation to economic growth.[58]

Given the usage of the human capital variable in growth equations, there was also an emergence of studies claiming originality through views that the measurement of human capital could be improved. For example, in 1993, Wolff and Gittleman[59] argued that it was misleading to use schooling enrolment rates (SERs) as a proxy for schooling as enrolment rates were a reflection of the future labour force and not a reflection of the current labour force.

According to Wolff and Gittleman, the appropriate measure of schooling was to use the educational attainment of the labour force and this was defined as the percentage of the active labour force that had attained a certain level of schooling. Wolff and Gittleman had also argued that educational attainment by specific educational levels were preferable to the use an aggregate human capital estimate of the labour force. Results showed that there was a link between investment in physical capital and the availability of a more qualified labour force, particularly those with secondary education. This better qualified

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[58] Gemmel (1998) provides a short overview of the two models and the findings of some of the studies that have examined the human capital factor using either one of the two models. Sianesi and Van Reenen (2000), in their report to the dFEE notes that the evidence so far on the debate between these two models are inconclusive and consensus has yet to be achieved over which is the appropriate approach.
[59] Wolff and Gittleman used the traditional Cobb-Douglas production function model where human capital is a direct input to growth.

labour force became a complement to investments as they acted as a stimulus to investment.

However, when the investment variable was not inserted into the regression, the results gave importance to the enrolment rate variable. In this case, enrolment rates appeared to be a more powerful explanatory factor in per capita income growth. Wolff and Gittleman saw this as a causality explanation whereby high enrolment rates are an effect of growth and less of a determinant of growth. Summing up their different findings, Wolff and Gittleman note that there is some sort of cumulative feedback between educational attainment, investment and economic growth.

Gemmell (1996) had also criticised the use of the schooling enrolment rates (SERs) in the growth equation.[60] He claimed that by using the SERs, it did not allow for a clear distinction between human capital flow and accumulation effects, which could lead to misinterpretations of the role of the labour force growth. Gemmell constructed an alternative human capital measure, which was capable of distinguishing between the stock and flow of human capital.

[60] Gemmel used both growth theory models in his paper. He generally finds favour for the traditional production function method although he had also found evidence supporting Romer's new growth theory model.

Gemmel defines investment in human capital to include informal education, on-the-job training, health improvements and learning by doing, as envisaged by Lucas. He also believed that by distinguishing between primary, secondary and tertiary education, it would provide a better measure of the contribution of human capital towards economic growth. This new proxy of the schooling variable was tested on a sample of 98 countries for the period of 1960-1985. His findings revealed that the primary and secondary stock of human capital had a clearer impact among the LDCs. The tertiary education level stock on the other hand had a prominent role in developed countries.[61]

In the latest study by Barro (2001), another measure relating to human capital is looked into. In this 2001 study, the quality of schooling is raised and to test this variable, Barro uses scores on International examinations as indicators of the quality of schooling. He finds that by using the Science, Mathematics and Reading scores of 43 countries in his sample of 100 countries at various levels of development, quality of schooling appears to be a more important variable for growth relative to quantity of schooling. Barro's findings show that a one-standard deviation increase in Science scores would raise growth rates by 1.0 percent a year while a one standard deviation rise in educational attainment would increase the growth rate on impact by only 0.2 percent per year.

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[61] Gemmel notes that this does not mean that tertiary education is not important in LDCs and that primary and secondary education is invalid in Developed countries. He attributes the low impact of tertiary education in LDCs to the low quality of data available in LDCs.

So far, we have the notion that growth economists are kept "busy" investigating the role of human capital on economic growth[62] and on how the human capital measure can be improved.[63]

In a 1994 paper by Benhabib and Spiegel, cross-country evidence on the determinants of economic growth was examined. This paper by Benhabib and Spiegel is an attempt to distinguish between the two growth methods, i.e. the production function method and the new growth theory method. One of the findings in this paper drew the attention of growth economists whom by now were convinced that human capital did have a direct and positive impact on economic growth. Benhabib and Spiegel found that when they entered their chosen human capital data (Kyricou's 1991 human capital stock data) into the Cobb-Douglas production function, the result revealed a negative (but insignificant) human capital effect in explaining per capita income growth. This questioned the usual findings of the positive role of human capital as an input of production. In addition, these results appeared to be robust against a number of alternative specifications (i.e. by including different variables such as the relative size of the middle class in a country and a variable

[62] See Sianesi and Van Reenen (2000). In this report for the dFEE, Sianesi and Van Reenen had examined the various methodology used to estimate the returns to education at the macro level. In addition, they had also provided an extensive review of the methodological issues raised with regard to the methods that are available. Results obtained by various studies were also reviewed (22 studies in total) and they had looked into how various issues that were raised in these empirical studies relate to the United Kingdom.
[63] The latest paper (to our knowledge) on improving the measure of human capital is one by Mulligan and Sala-I-Martin (2000) where they attempt to set up human capital indexes for the United States. While doing this, they concluded that using the average years of schooling in examining the impact of human capital on economic growth could be misleading.

measuring political stability) and data sources (the alternative data source used was the Barro and Lee educational attainment 1993 data set).

Then, on further research, Benhabib and Spiegel used the levels of human capital in their model and found that the levels of human capital had positive but low and insignificant impact on growth. Using these findings, Benhabib and Spiegel concluded that there was still evidence of the positive role for human capital in economic growth but it was the stock of human capital that matters and not the growth rate of human capital that matters.

In completing the objectives of his study, Benhabib and Spiegel inserted the human capital variable according to the new growth theory where human capital has an indirect role in affecting productivity. By doing this, they found that the growth rate of TFP had depended on a country's human capital stock level. They concluded that human capital did not directly affect growth rates but acted as a stimulus for TFP and had helped determine the magnitude of the residual in the Cobb-Douglas Production function.

The reaction to the Benhabib and Spiegel finding of insignificant impact of changes in human capital on economic growth did not seem to stir much commotion till the emergence of Pritchett's 1996 paper on human capital and economic growth. Pritchett (1996 and later revised in 1999) found that improvements in educational attainment of the labour force had no positive impact on the growth rate of output per worker. The questions raised were firstly "Where did all the education go?" and later on, "how do we reconcile the high and positive findings of human capital found at the micro level with this low impact of human capital found at the macro level?". The explanation provided by Pritchett in relation to the former question seems to indicate country heterogeneity as the major reason for this insignificant impact of human capital. Breaking it down into three main points, Pritchett reckons that: -

- In some countries, schooling did not help create skills and knowledge and this impact covered the positive skill and knowledge creating impact that schooling had in other countries.
- Certain countries (especially those where schooling was useful as a tool for creating knowledge and skill) did not put the knowledge and skills acquired via schooling to proper use. Due to this improper usage (for example, educated labour being absorbed by the public sector to reduce unemployment among graduates), output is affected which subsequently affects the social returns to education.
- The rate of growth of demand for educated labour varies across countries (as each country has their own policies and sectoral shifts), the marginal returns to education is affected.

In relation to the findings in these two papers (i.e. Benhabib and Spiegel and Pritchett), Krueger and Lindahl (1998) and Temple (1999b, 2001) attempt to shed some light on the results of the weak link between human capital and economic growth. In Krueger and

Lindahl (1998), measurement error is said to be the perpetrator causing the weak link between human capital and economic growth in Benhabib and Spiegel's paper. This measurement error in education is exacerbated by the inclusion of the physical capital variable. When Krueger and Lindahl used the Instrumental Variable method to correct for the measurement error found in the data sets, the human capital variable was positive and significant in relation to economic growth.[64]

In Temple (1999b), the Benhabib and Spiegel data set was found to contain unrepresentative observations or simply, outliers. These outliers "cover" the true effect that human capital could have on economic growth. Temple notes *"It may sometimes be necessary to omit a few observations, in order to discern the pattern present in the majority of the cross-country data".* He goes on to show that by eliminating 14 observations[65] in the Benhabib and Spiegel data set, the change in human capital brings about positive (14 percent) and significant impact on economic growth.

Then in Temple (2001), an attempt is made to find an alternative specification to explain the link between human capital and economic growth. In this paper, Temple notes, *"Yet rather than simply eliminating outliers, we may want to explore alternative, more general specification that provide a good fit for the whole sample".* Temple used models, which

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[64] Krueger and Lindahl had set out to reconcile the micro and macro findings. When they had corrected for measurement error, their results indicated that the macro returns were higher than the micro level of returns to education.
[65] The methodology recommended by Temple is the least trimmed squares.

allow for varying productivity levels of an extra year of schooling to vary with the level of schooling and non-linear specified models. The results showed that the low magnitude of the human capital effect (but significant at the 10 percent level for the Benhabib and Spiegel data set) continue to prevail.

In conclusion to this section, it appears that the empirical evidence of a positive link between human capital and economic growth is weak. As we have noted in Chapter 3 and as shown in the later papers that we have discussed in this section, this weak link is highly associated with weak human capital data. However, one cannot use this weak finding to draw the conclusion that human capital does not matter to growth[66] but looking along the lines of Temple (2001), the situation can be improved in time as more and better data becomes available. For now, it would appear that the micro estimates could well be more robust than those obtained at this macro level in examining education, training and its link with economic growth.

> "This (uncertainty in the macro results) might call into question the relevance of micro estimates in returns to schooling, at least for developing countries". (Parenthesis added)
>
> Temple, 2001

[66] Pritchett (1996) notes "Showing that education is not a sufficient condition for growth does not lessen its importance for children – but rather raises the importance of identifying and undertaking those complementary reforms in the non-education sector that will lead education to pay off."

4.3 IMPACT ON THE INDIVIDUAL

There are numerous studies on the impact of investments on human capital, i.e. the returns to education and training to the individual (or at the micro level). The purpose of this section is to examine how the micro models discussed in the previous chapter have been used to empirically measure the impact of education and training. The studies that we have chosen to look into will also describe how some of the methodological issues attached to the human capital earnings function are handled (especially in the rate of returns to education measurements). Due to the large set of studies[67] in both these areas, section 4.3 will be divided into a section on the impact of education on the individual and another section on studies conducted on the impact of training on the individual and on the firm.

4.3.1 Education

Within the education section, the bulk of literature reviewed is the rates of returns to education studies. As there is a vast coverage of this literature, we will first present some of the general findings of the rate of returns studies for the world (as summarised by Psacharopoulos, 1994) followed by a discussion on the application of the rate of returns to the individual countries. Majority of the studies discussed in this first section concerns the developing countries. We choose to do this in accordance with the country of analysis in this thesis, i.e. Malaysia, which is classified as a developing country. In the second part of

[67] Needless to say, this section is non-exhaustive. We aim to try to capture the main issues involved from the vast amount of literature that is available within this area of research.

this section, we will look into how some of the rate of returns studies have attempted to tackle and investigate the implication of the econometric and/or methodological issues raised in the previous chapter. We will find that majority of the studies in this second part will constitute findings from advanced countries where more comprehensive databases are available for such analysis.

The models adopted in these studies range from the human capital earnings function or the Mincerian Earnings Function[68] to obtain a figure that explains the impact of an additional year of schooling on income to the more complex cost and benefit analysis to derive the internal rate of return.

Psacharopoulos (1994) via his survey of various reliable studies (the year of the surveys analysed ranged from 1967 to 1990) on the rate of returns to investments in education around the world concluded that: -

- Primary education exhibits the highest social profitability in all world regions.
- Social[69] and private returns at all levels decline by the level of the country's per capita income. (Confirmed in Ram, 1996).

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[68] Krueger and Lindahl (1998) quote in their paper, "The Mincerian Earnings function is one of the great success stories of empirical economics". From their survey of literature, empirical work using the Mincerian Earnings function was found to be able to provide a good explanation of the relationship between earnings and education.

[69] The term social here could raise doubts, as we are not certain of the elements that have been included in estimating the social returns to education. If the researcher had included the elements (we appreciate that not all elements are easily available and that those which are readily available should be used appropriately) that we have discussed in Chapter 3 (Tables 3.1 and 3.2), the estimation of a social rate can be justified. In Ram (1996), the "social" rate of returns has been calculated based on his usage of aggregated output data.

- A declining pattern of returns to education is displayed as observed over time. (Some of the individual country studies, which confirm this finding, are Demetriades and Psacharopoulos (1987) for Cyprus, Deolalikar (1993) for Indonesia and Appleton, et al. (1998) for Kenya. A study on Taiwan by Gindling, et al., 1995 found that private rate of returns for all education levels in Taiwan were stable during the period 1978-91 and claims that declining rates over time were not applicable in Taiwan for the time period investigated).[70]
- Returns to female education are higher than those for males. (Some individual country studies which display such results, are Schultz (1993), Deolalikar (1993), Gindling, et al. (1995) and Moock, et al. (1998) for Vietnam). So far, we have only encountered one study at the national level, which has found the contrary, i.e. returns to education for males are higher than those found for females. This study is one by Phan (1995) using data on Singapore.
- Returns to the academic/general secondary school track are higher than the vocational track (For a further discussion on this finding, see Bennell (1996b) who did an overview of the limited number of studies investigating this finding and found that the existing evidence is not convincing enough to support the finding that returns to the academic secondary school track is higher than the vocational secondary educational path).

Ram believes that the external effects of education on income should be captured in his aggregated output measure.

[70] The returns to education over time will be expounded in Chapter 7 of this thesis.

- Lowest social returns were found for physics, science and agronomy and highest private returns for engineering, law and economics. (Among the few country specific studies, which have examined the different returns to different fields of study are Vaillancourt (1995), Hunt and Hicks (1985), Bird (1991) and Phan (1995)).
- Returns to education for those working in the private sector of the economy are higher than for those who work in the public sector. (Al-Qudsi (1989) found that this had indeed occurred in Kuwait)

In studies where the rate of returns were calculated for a specific objective, we find that the rate of return results were applied differently according to the needs of the country at a particular point in time. In some cases, it was used to ascertain certain aspects of the economy over a period of time, in particular the development of the labour market or the expansion of the educational needs of the people in a country. Although there are studies, which have not looked into the policy implications of their results (i.e. these studies merely calculates and report the rates of return results with the objective of providing further evidence to the trends found by Psacharopoulos), we have presented some of these findings and have derived our own thoughts on how these results could be applied to the individual or could be used by the government in policy decision making and implementation.

For example, the results from studies which have looked into specific courses of study (Bird, 1991) or into specific areas of study such as science, mathematics and health

(Vaillancourt, 1995 and Hunt and Hicks (1985)) would be applicable to an individual as it would help them to decide on the course that he or she may want to embark into. This function of the rate of returns is on the assumption that the individual is driven by the future profitability of the course, rather than its inherent interest. On the other hand, from the view point of the government, the government would be able to pin point specific policies to "attract" its qualified citizens to take up certain areas of study that are deemed important for the growth of the economy.

In the study for New Zealand by Bird (1991), results showed that there were dramatic declines in the internal rate of returns to medicine and pharmacy for men and accountancy and medicine for women when the opportunity cost of time[71] is included. The opportunity cost of time is a usually ignored indirect cost in most IRR studies. The results from Bird's study could provide indications that while "big" money could be earned from such professions, there are other consequences that one may have to bear and consider should they decide to embark on the investigated professions.

In Vietnam, Moock, et al. (1998) utilised both the earnings function and the cost-benefit analysis to derive the rates of returns to the different levels of education. The results show that primary education received the highest rate of return among all the schooling level

[71] The opportunity cost of time is the loss of an alternative use of time devoted not just to study but to the demands of the profession.

(both private and social). The private rates of return were found to be higher than the social rates. Due to the over-subsidisation of higher education, the social rate of return compared to the private rate of return at the university level was low (3.0 compared to 6.2). These new estimates of the rates of return would enable the Vietnamese authorities to study the implications for the financing of education in Vietnam and would also provide an opportunity for them to look into possible educational expansion policy. In this particular study for Vietnam, implications for the financing of education in Vietnam were drawn based on the results obtained.

Primary education, which was found to be the most profitable level of education (based on the private and social rates of return), was much less subsidised than higher levels. Family contributions to direct cost financing at the primary level were deemed to be a heavy burden especially for the poor, and this was considered as neither socially optimal nor equitable. Hence, based on the results, Vietnam's policy makers were urged to consider direct subsidisation of poor primary school age children to ensure that they enrol in school and remain enrolled.

In another scenario, in Australia, an important assumption in government policy in the area of indigenous education was that increasing education attainment would increase the employment rate and incomes of indigenous Australians. However, data revealed that indigenous adults were less likely to have stayed in school past the age of 16 years and were more likely to have received no schooling at all. It had also revealed that school retention rates remained lower for the current generation of indigenous youth than for other Australians. Daly and Liu (1997) hypothesised that the poor retention rates among the Australian indigenous group had a link with the returns to education investment by this group of people.

The question raised in this study by Daly and Liu (1997) was *"How worthwhile is the investment of time and money in an extra year of schooling, given the likely addition of income in later life associated with higher schooling levels?"*. The results of this study suggested that for indigenous males and females, there were considerable financial benefits to completing a post-secondary qualification, but the return to additional post-compulsory secondary schooling was less attractive. The lower private rate of return to post-compulsory secondary schooling would, in part, explain the very low retention rates to year 12 among indigenous youth.

In addition to confirming the hypothesis at the beginning of the analysis, the results had also revealed that the difference in perceived non-pecuniary costs and benefits for indigenous Australians compared with other Australians were found to be important. In this case, the derivation of the rates of returns to education was used to assist the Australian government in designing policies to increase the educational attainment of its indigenous Australian youth.

In another study, Newell and Reilly (1997) conducted an investigation to determine whether the changes in the returns to higher education had an impact on wage inequality among the transitional economies. The results obtained revealed that over thirteen percent of the variability in wage inequality was attributable to the variation in the estimated returns to higher education. This finding suggested that higher education attainment in the transitional economies had a role to play in changing the wage inequality situation, indicating yet another application of the rate of return to education estimates.

In Indonesia, the rate of returns to education results on men and women helped provide explanations pertaining to the issues of education for women and female labour participation. Deolalikar (1993) found that the returns to secondary and university schooling are higher for women than men. To explain these findings, Deolalikar reckoned that the high returns to women were due to these three possible explanations: -

(a) There were differences in selection into the different education levels between men and women. For example, because it may be more difficult for better educated women than better educated men to find good jobs, only those women whose inherent intelligence or productivity is very high will decide to enter into the next higher level of education. Therefore, the sample of females with higher education may be more inherently productive.

(b) A second possible reason of why returns to education were higher for women was that unmeasured gender differences in traits such as manual dexterity, stamina or strength (which is usually associated with men) could be valued highly by the market at the lower education levels.

(c) Labour market discrimination against women could be greater at lower education levels, causing the male-female wage gap to be much greater at lower education levels than at higher education levels.

Based on this deduction, Deolalikar called for further research which would allow researchers to identify how and if individuals (especially the females) were taking advantage of the higher returns to female schooling. He had also highlighted that there were indeed incidents of households under-investing in their female children's higher schooling due to higher opportunity cost and called for more research into finding ways of encouraging women to stay on in school.

Rate of returns to education results could also assist in the area of examining the possibility of expanding education within a country, e.g. making a decision on whether to increase the number of highly educated population. Educational expansion could affect two components within the labour force in a country, one, the educational composition of the labour force and two, the change in wages. This examination can be further extended to look into whether educational expansion has increased or decreased the inequality of pay and hence, income distribution (See Knights and Sabot, 1983).

There are also studies, which have used the rate of return estimates as the dependant variable to investigate the determinants of these rates of return so that countries could be assured of reaping the benefits of the rate of returns to education. In China, Li and Zhang (1998) found that reaping returns from schooling investments required appropriate economic/political environments. In Costa Rica, Funkhouser (1998) found a positive relationship between the rates of return to education and measures of demand for education and a significantly negative relationship between the rate of return estimates and measures of supply for education. This indicated that the changes in the rate of returns to education were dependent on the demand and supply of education and that the rate of return estimates would need to be updated to reflect these changes.

On the whole, one can see that the rates of return estimates appear to be a powerful indicator to use in designing policies not only on the area of education but on other areas in an economy such as providing signals pertaining to the labour market. The final few studies discussed also show that changes in the economy needs to be considered when examining the rates of return to education estimates. The results indicate that the rate of returns to education estimates would need to be updated at a reasonable interval of time to reflect the changes in an economy. As a final say on the usage of the rate of return estimates, we quote Harmon and Walker (1995): -

> "The rate of return to schooling is an important factor in determining educational attainment and participation and, ultimately, wages and incomes".
>
> Harmon and Walker (1995)

The second part of this section will look into studies, which have attempted to tackle some econometric issues raised in relation to the methodology used to estimate the rates of return to education. The majority of the studies are available more so among the developed countries compared to the developing countries where more comprehensive and advance databases are usually not available easily for analyses.

In Falaris (1995) an attempt was made to tackle the sample selection issue generally linked to female samples. He found that the result of a previous study conducted for Venezuela to be misleading. The female wage equation estimated in the previous study was conducted without correcting for sample selectivity. By using a 1981 data set, Falaris found that the rate of returns to education was 8.6 percent when the result was corrected for selectivity bias. A 12.1 percent rate of return was obtained when selectivity was ignored. Therefore, Falaris's findings suggested that women's education in Venezuela is an attractive investment but not as attractive as implied when sample selectivity is not considered.

Similar results were obtained in studies for Ghana and Cote d'Ivoire women where estimated private rate of returns to schooling were marginally lower after corrections for sample selection was applied (Schultz, 1993).

Other than the issue of self-selection, another concern that is constantly debated on among researchers in this field is the omitted ability variable and the presence of measurement error in the education variable and its effect on the rate of returns to education estimate. Sieving through the literature that is available and having discussed the detailed econometric models used in improving rate of returns estimates in the previous chapter, there appears to be four approaches taken to tackle these econometric issues. They are: -

i) To include a proxy for the ability variable in the earnings equation as an independent variable. For example, Blackburn and Neumark (1993, 1995) find that the OLS estimates are biased upwards due to the omitted ability variable and downward biased due to measurement error.

ii) Studies using samples of twins is another approach taken to verify the extent of these two problems. If the omitted variable did have an effect, rate of return estimates without controlling for ability would be biased upwards. Studies like Miller, et al. (1995), Ashenfelter and Krueger (1994) and Ashenfelter and Rouse (1998) used the basic framework taken from the Mincerian Earnings Function to analyse the effect of the omitted ability variable using data collected from a sample of twins. These studies however seem to indicate that the omitted ability variable did not bias the estimated returns to schooling upward.

In this 1994 paper by Ashenfelter and Krueger, measurement error in the schooling variable was found to bias the returns to education estimates downward. This paper by Ashenfelter and Krueger later became an important reference material for microeconomists when they made an attempt to correct for this measurement error via the classical measurement error model.[72]

In finding this downward bias, adjustments for measurement errors, wherever possible, were made and a higher rate of return estimate was obtained. In Ashenfelter and Krueger's study, an additional year of schooling increased wages by 12 to 16 percent after considering the measurement error bias. In an updated twin study, Rouse (1999) confirms the downward biased rates of return results when measurement error is not given due attention.

iii) The third approach taken is the usage of instrumental variables (IV) to correct for the endogeneity in the schooling or education variable. In the literature that is available, the IV used consisted of natural experiments, i.e. the usage of quarter of

[72] This model is discussed in section 3.3.2.1.1 of the previous chapter under the sub-heading "Double Solution".

birth as instruments (Angrist and Krueger, 1991) to using sibling sex composition as an instrument (Butcher and Case, 1993).

Dearden (1999) used the National Child Development Study (NCDS) in Great Britain to investigate some of the issues mentioned above. Dearden attempted to analyse the importance of the omitted ability and family background biases and the measurement error bias (as found in Ashenfelter and Krueger) in estimated OLS rates of return to education. Three other issues examined in Dearden's study included the issue of self-selection, heterogeneity in the returns to education and the impact of education on gender-wage differentials.

Her results revealed that the OLS estimates of the rates of return are reasonable estimates because the omitted variable bias is offset by the compositional bias and measurement error bias. This strengthens the finding of other studies which finds that the OLS estimated rate of returns to education are reliable and the usage of minimal data to obtain the estimates is valid.

Dearden's research also finds evidence of heterogeneity in the returns to education in Britain. The validity of heterogeneity within the returns to education finding was also found in Ichino and Ebmer (1999) who had examined the returns to education for a group of male German workers. In Meghir and Palme (1999), the Swedish population was found to have benefited from the reforms in the Swedish education system even after controls for heterogeneity were taken into consideration.

Considerable research on this area of investigating the extent of changes in the estimated rate of returns to education due to the omitted variable bias have also been conducted in Sweden. The general conclusion obtained in these studies is similar to that found in Dearden's study. OLS estimated rates of return to education are reasonable estimates (See Arai and Kjellström, 1999).

In most studies, which have utilised the IV methods, the IV estimate is always higher than the OLS estimates. When using IV estimates, the rate of return estimates are the returns for individuals with higher discount rates compared to the OLS estimates, which are average returns for an individual in a population. In addition, different instruments are found to generate different estimates of average returns for different subgroups in the population (Ichino and Ebmer, 1999).

The only study which found results contrary to these two findings presented above is the Harmon and Walker's (1999) study where they find that the large downward bias in the OLS rate of return estimates is significant compared to the estimates obtained using the IV methods. They also find that these estimates are consistent and stable with respect to the choice of the instruments (hence, refuting the findings that different instruments will produce different results). The choice of instruments was found to be important when Harmon and Walker relaxed the assumption of linearity between schooling and earnings.[73] The conclusion drawn by Harmon and Walker was in contrast to what Dearden had reported regarding the reliability of OLS estimates, i.e. *"It would appear that simple OLS estimates are subject to a bias and so should not be relied upon for policy decision"*.

This statement by Harmon and Walker did not become an ultimatum as the search for the "true" rate of returns to education estimate continues. In Behrman and Rosenweig (1999), a new component of ability bias is introduced while in Bound and Solon (1999), the measurement error in reported schooling may not be classical (but could be a mean reverting measurement error)[74] as derived by Ashenfelter and Krueger (1994) in their pioneering twin study on measurement error.

Card (2000) offered four possibilities leading to the difference between the IV and the OLS estimates. He notes that it could be due to (a) measurement error, (b) heterogeneity in the returns to education, (c) specification search bias, an issue suggested in Ashenfelter, et al. (2000) and (d) unobserved differences between the characteristics of the "treatment" and "comparison" groups implicit in the IV scheme.

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[73] They did this by including the number of years of post-18 schooling in addition to the total number of years of schooling in the right hand side of the earnings equation.
[74] The mean reverting measurement error represents the negative correlation between reporting error and true schooling (Bound and Solon, 1999).

iv) The final approach used to control for the endogeneity factor in schooling is to treat ability as a fixed effect in a panel data setting (Angrist and Newey, 1991 as quoted in Harmon and Walker, 1995).

The corrections and improvements as we can see from the review above have mainly been carried out in developed countries whereby larger and better quality data sets are easily available. It would however, be interesting if further research could be carried out in developing countries to see if the IV method would fit in a developing country setting.[75]

4.3.2 Training

At the beginning of this chapter, we have seen that human capital does not only cover the formal education that is received but should and could include on-the-job and/or off-the-job training or other forms of work-based skill acquisition[76] obtained by the individual. Barron, et al. (1989) reported that in their sample of US entry-level workers, a newly

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[75] Krueger and Lindahl (1998) provided a table summarising OLS and IV estimates of the returns to education with instruments based on natural experiments and they have listed a study by Maluccio (1997), a study conducted in the Philippines and another one conducted for Indonesia by Duflo (1998). In the study by Maluccio, it appears that the IV estimates were double the OLS estimates while in Indonesia, the two models showed a difference of 0.03 percentage points. Krueger and Lindahl had also conducted a Hausman test on the equality of the OLS and IV estimates and the results show that a majority of the studies have OLS and IV estimates which are similar, i.e. not being able to reject the null hypothesis that the OLS and IV estimators are the same.

[76] The definition of skills differs among employers as noted in Green, et al. (1998). It is usually thought of as something that is technical but one may find that some employers associate skills with behavioural attitudes of a person (e.g. communication skills, problem solving skills, and so on). Measuring skills is another issue that is of concern among economists. A conference was held at the University of Kent at Canterbury in March 2000 to discuss the issue of skills measurement. The various papers presented in this conference are published in the Oxford Economic Papers, Volume 53 (3). The papers include one by Stasz (2001) which examines the meaning of skills and another which looks into the usage of international data sets to compare skills across countries (Steedman and McIntosh, 2001).

hired person spends one-third of their time in training. The training was found to have occurred in the first 3 months of employment. This shows that time and money would need to be invested in training a person, especially one who is new to the job. Therefore, just as it would be important to examine the rate of returns to education for better policy making and decision making, it would also be deemed important to examine and obtain estimates of the rate of returns to training. In addition to looking at the effects of training on the individual, we would also need to identify who are those most likely to be trained or most likely to undertake training. The results from such investigations could help in the formulation of a training system and training policy within a firm and within a country. When reviewing the literature on training,[77] we can divide the literature to studies conducted at the individual level and those conducted at the firm level. Individual level studies utilise individual cross-section data (or at times, longitudinal data sets) for analysis while firm level studies are usually based on firm level data.[78]

The Impact of Training.

On the Individual.

Majority of the studies that we present in this section is studies conducted in the UK and the US. In a study by Greenhalgh and Stewart (1987), vocational and non-vocational

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[77] Machin and Vignoles (2001) contain a comprehensive literature review on the various UK and US study on the economic benefits of training to individuals, firms and the economy.
[78] In Dearden et al. (2000), individual level data and aggregated data were jointly used to examine the impact of training among British industries.

training[79] in the UK were found to yield positive returns with the former indicating higher returns. The results based on the National Training Survey conducted in 1975-1976 also showed that after 4 weeks of training, the marginal benefits accruing to the trainee fell to zero. This result seems to indicate that there was a threshold level of training after which the returns to training will decline.

In Blundell, et al. (1999a), by using data extracted from the National Child Development Survey Data in the UK, positive returns were consistently found for the different types of training for both men and women. The returns for on-the-job employer-provided training courses were found to have returns of 3.6 percent for men and 4.8 percent for women. Off-the-job employer-provided training courses had a higher level of returns at 6.6 percent for men and 9.6 percent for women.

Lillard and Tan (1992) utilised two US data sets, i.e. the Current Population Survey (CPS) 1983 and the National Longitudinal Study (NLS) for the period 1966-1981 to estimate the effects of training on the US population.[80] Lillard and Tan divided training into two main categories, i.e. those taken to improve skills and training taken to obtain a job. The results from the CPS data set revealed that company training had the largest effect on

[79] Vocational training in the Greenhalgh and Stewart study was defined as training undertaken in relation to the current or subsequent employment. Non-vocational training was classified as any general adult and further education undertaken during the person's working lifetime.
[80] The study was restricted to the male sample in the CPS and the young men cohort (those aged 14-24 in 1966) in the NLS.

training to improve skills compared to regular school training and informal on-the-job training. Returns were estimated at 27 percent for this type of training. Training received from the person's previous employment appeared to have an effect of 17 to 20 percent on earnings in the current job, leading the researchers to note that skills could be transferable.[81] In their analysis using the NLS, given the longitudinal nature of the data set, Lillard and Tan were able to track the returns over time for a particular cohort in the data set. They found that for the young men cohort in the NLS, the net effect of training is an increase of 9.5 percent in the first year of being in the labour force and 10.8 percent in the second year. The effects of training had declined to zero by the eleventh year of the person being in the labour force.

Bartel's US study[82] published in 1995 had also found training to have a positive and significant effect on wage growth. In another study on the US training scene, Barron, et al. (1995) found that wages grew by 1.5 percent for every 10 percent increase in training.

Groot (1995) used the Dutch Brabant Survey 1983 data to estimate the returns to enterprise training[83] in the Netherlands. The researcher divided enterprise training into

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[81] Lillard and Tan issued caution that these results have not been corrected for endogeneity due to sample selection.
[82] However, Bartel's results were based on personal data taken from a large company and hence, one could argue that the results could be specific for that one company. Bartel used this data set to eliminate heterogeneity bias in the estimation of the effects of training on the company's productivity and workers.
[83] Enterprise-related training is defined as all formal training organised by the firm itself or by some outside training institution hired by the firm (Groot, 1995).

three types of training, technical, economic-administrative and other forms of training. [84] The results show that technical training had the lowest return (5.2 percent) while the economic-administrative type of training had the highest return (50.2 percent).

At this point, it strongly appears that the effects of training on an individual are positive and significant. The training that is measured is sometimes divided into the different types of training to examine the individual programme effects on an individual. So far, we have only found one study, which deflects from the general evidence that training does bring benefits to both the firms and individuals. In a study by Goux and Maurin (2000) the estimated impact of training on an individual was found to fall close to zero after having considered selectivity of the firm's training practices and the selectivity of post-training mobility in France. When they did not consider self-selectivity in their model, French workers were found to have earned about 5 percent more after a training period, which reverts to the standard results that is usually obtained.

Goux and Maurin argue that the zero-impact could not be due to the peculiarity of firms in France where firms stand to lose money if they could not give the impression that they were conducting training. They refer to such training as cosmetic training, i.e. training provided even when not needed. According to Goux and Maurin, the statistics available

[84] Technical training in Groot's paper includes pure technical training and/or technical training with some economic, administrative or commercial aspect. Economic-administrative training encompasses training such as training in administrative procedures and management. The other forms of training in Groot's study covers other training not within the former two categories such as science training, legal training and so on.

on the structure of firms in France did not provide logical arguments to show that there was a need for firms to conduct cosmetic training. Based on this and the findings that there were positive returns when the data was applied to similar models as existing studies, Goux and Maurin concluded that the zero-impact of training on wages was due to the presence of selectivity in training practices in French firms. Other findings contained in this study included evidence that firm-provided training had lowered the probability of employees switching between firms in France.

On a more general note pertaining to the outcome of training for an individual, studies have also revealed that acquired skills from training display similar characteristics as education as it depreciates over time (Lillard and Tan, 1992). Stevens (1999) notes that it is important to distinguish between the different types of skills acquired in order to be able to determine the receiver of benefits from the investment in training (Based on Becker's early work in 1964). General skills are skills that can be carried on into other firms or occupation, which the worker embarks into. These skills are assumed to be operable in a perfectly competitive labour market whereby workers are paid according to his or her marginal product.

In contrast, specific skills are skills, which are only useful for a particular employer. Becker notes that due to this, workers with firm-specific skills are paid below their marginal product; hence the benefits or the returns to training are shared between the firm and the worker who has received these specific skills training.

Green and Montgomery (1998) found that in their sample of young workers, 1 in 6 workers perceive that they had only acquired firm specific skills in their first job. This finding, based on the theory raised in Stevens' article, would suggest that benefits from training are shared between the firm and the individual, with the individual receiving wages below his marginal product. Green and Montgomery does note however, that future or prospective employers considering employing those with specific skills would not totally displace these skills that have been obtained as surveys do show that employers do consider other factors such as personal attitudes.

On the Firm.

The results discussed so far covers the outcome of the impact of training on an individual. We will now move on to discuss the impact of training on the firm using firm-level data. Evidence on the impact of training on firms is not as widely available compared to those seen at the individual level. We think that this is due to the insufficiency of firm level and aggregated data that is available for analysis. Existing studies, amongst others[85] include Greenhalgh and Stewart (1987), Barron et al. (1989), Lillard and Tan (1992) and Bartel

[85] The OECD employment Outlook (OECD, 1999) provides an overview of the findings from recent studies of Job-Related Training in the appendix section of Chapter 3 in the report.

Bartel (1995). These studies conducted in the UK and the USA have generally found training to have a positive and significant effect on productivity. In the latest study of the British industry, Dearden, et al. (2000) found that an increase of 5 percentage points in the proportion of employees trained would bring about a 4 percent increase in productivity.[86]

Given the difficulty in investigating the impact of training on the productivity of firms (amongst developed countries), this next study that we wish to discuss would seem to be very valuable especially for developing countries. A study was conducted by Tan and Batra (1995) on Enterprise Training in Developing Countries using firm level data from five economies in East Asia and Latin America. The aim of this study was to provide insights into firm led training in developing countries. The five countries investigated were Indonesia, Malaysia, Colombia, Mexico and Taiwan.

In this study, training was found to have raised firm-level productivity. This finding was discovered via the production function model to investigate the relationship between employer investment in training and productivity. Indonesian[87] manufacturing firms who had conducted training were on average, 71 percent more productive than those manufacturing firms who did not provide training to their employees. The effect on

[86] In this study, warnings of measurement error in the training variable were also issued. This measurement error warning remind us of similar problems found in measuring the "true" impact of education on economic growth as discussed earlier in this chapter.
[87] The Indonesian survey was conducted in 1992.

productivity due to training for Colombian[88] manufacturing firms was 27 percent increase in productivity levels while for Mexican manufacturing firms who had trained their employers, 44 percent of higher productivity was accrued.[89]

The Determinants of Training.

When we have information on the characteristics of the individuals who are trained by firms and/or those who are likely to seek training, we would be able to formulate training policies and systems to help ensure that training is effectively sought and given. Likewise, it would be important to be able to identify the characteristic of firms who train and in so doing, be able to identify firms who do not train. Information of this nature would assist in completing the picture for each country's training policy and system. The probability models, such as the probit model that we have briefly discussed in Chapter 3 are used most-often in the identifying of individual and firm characteristics. In this sub-section, we will again divide our discussion into the individual and firm level information.

The Characteristics of Trained Individuals.

Bartel (1995) found that in one US company, the higher the relative status of an employee, the more likely he or she would have received training in the company. The relative status of the employee was measured by the ratio of an employee's salary relative

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[88] The Colombian and Mexican surveys were also conducted in 1992.
[89] These positive effects of training on productivity remained after Tan and Batra had corrected for self-selection bias in the training variable. The Malaysian results will be discussed in section 4.5 of this chapter.

to other colleagues performing the same job. Other than this group of people, the analysis on Bartel's company database had also revealed that those with more years of education, those new in the company, measured by the length of service at the company were people who were more likely to be trained.

Using the less restrictive CPS and NLS data sets collected in the US, Lillard and Tan found that

- Young men (aged 14-24) and mature women (aged 45-59) were more likely to be trained compared to matured men (aged 45-59) in the NLS data set. However, when company training is examined specifically, women were found to receive less training than men do.[90] The first finding seem to indicate that for men (at least) in the US, training decreases as age increases while the second finding seem to be consistent with findings that women are generally given less training.[91]
- Education and training are complements. The more educated the person, the more likely they would be trained (Similar findings to that found in Bartel's one company analysis).

[90] The CPS data set showed that men and women received approximately similar amount of company training.
[91] The typical argument for this to happen is the believe that women have weak attachments with the labour force/company due to the possibility of taking up household responsibilities later on in their working lifetime.

In the UK, the determinants to training is more extensively researched and updated. Studies include that conducted by Greenhalgh and Stewart[92] (1987), Green (1993),[93] Blundell, et al.[94] (1996), Harris (1999) and Shields and Price (1999).[95]

The following lists the characteristics usually found in studies examining the determinants of training in the UK.

- Training decreases as age increases. (This characteristic is also dominant in Germany and the Netherlands (OECD, 1999)).
- Unionised workers get more training.
- Higher educated workers are likely to receive more training. (The OECD 1999 report noted this characteristic in all OECD countries except The Netherlands).
- Persons working in the public sector firms and larger establishments are likely to receive training. Harris (1999) expanded on the latter finding noting that these large establishments were willing to train individuals even when there were possibilities of receiving lower returns from these individual's training.
- Training probability increases as tenure in the firm increases. In Harris's study, this effect was found to be strong for the male workers.
- Newer recruits in the company have higher likelihood of being trained.

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[92] Greenhalgh and Stewart (1987) used the National Training Survey 1975 while Green (1993) used the 1987 General Household Survey.

[93] There are additional references leading to studies conducted on the UK determinants of training in Green (1993).

[94] Blundell, et al. (1996) used the National Child Development Survey (NCDS) 1991, Harris (1999) used the September-November 1995 UK Labour Force Survey (LFS) and Shields and Price (1999) used the 1992 Quarter 4 to 1994 Quarter 3 UK Labour Force Survey.

[95] Further discussion on the determinants of training can also be found in Ashton and Green (1996) – Chapter 3. There is also a brief summary of the determinants of training for the UK and US in Blundell, et al. (1999b).

- Non-white workers are found to receive less training. Shields and Price (1999) reckon that this occurs due to the higher probability of non-whites quitting their job, hence discouraging employers from investing funds in their training. The lower probability of non-white training could also have been attributed to the person's[96] inability to communicate and understand the English language, which hinders them from completing the training course provided. Another suggested reason for the low probability of training for non-white is simply pure discrimination by employers.
- Men are generally found to receive more training than women. Harris's study confirms this when he finds that male dominated industries such as the petroleum, chemical, electronic engineering and so on had higher probabilities of receiving recent training while female dominated industries such as the textile and clothing industry received less training.
- Married women or at least those with family caring responsibility (Green, 1993) were less likely to have received training.

These studies have been able to allow us to identify some of the characteristics of those who would be more likely to receive training. In Ashton and Green (1996), it is noted that there is limited evidence of studies that have examined the issue of being credit constrained in the determinants of training. This thesis will however, be able to consider

[96] The new immigrants would face this problem more often then those who have already been in the country for a longer period.

this factor and hence, the existence of this factor in our analysis will be an original determinant of training being considered in this research. This credit-constrained issue will be explored in Chapter 5 of this thesis. So far, we have looked at the characteristics of individuals who are more likely to receive training. In the next sub-section, we will briefly look at the characteristics of firms who are more likely to conduct training for their workers.

The Characteristics of Firms who will train.

The characteristics of firms who will train are slightly more difficult to determine as again, researchers are limited by the lack of firm-level data. However, from the studies that have examined the determinants of training using individual level data (as presented in the previous section), we are able to note that larger establishments and the public sector have a higher likelihood to train their workers. It has also been identified that the finance, insurance and business or community, social and personal services industries are more likely to conduct training for their workers compared to the other industries (OECD (1999)).

In the developing country context, we again have the advantage of the Tan and Batra (1995) study where they have identified that

- Many firms in the five countries (i.e. Indonesia, Malaysia, Colombia, Mexico and Taiwan) that they have analysed do not train their employees.

- The Colombian, Indonesian and Malaysian survey data showed that employers provided little or no training because they were mainly using well-established technology which provided little scope for further productivity improvements through worker training.
- In-house training capabilities varied across economies. On the one extreme end is Colombia where only 4 percent of employers were found to train their employees in-house while Malaysia is on the other end of the line showing 25 percent of employers trained in-house. Indonesian and Mexican firms fall in between these two extremes.
- Most external training occurs in the private sector.
- Technology shapes the skill requirement of employers. Firms with the following characteristics were found to be more likely to train their workers.
    - Large firms
    - Firms which employed an educated work force
    - Firms which invested in R&D
    - Firms which possessed technology or know-how licences
    - Firms with foreign capital participation
    - Firms which used quality control methods and
    - Firms which exported to foreign markets.
- Workers benefit from investments in training and technology. The gains that the firms get from training are shared with the employees in the form of higher relative

pay (this part of the research was only conducted for three countries, Taiwan, Mexico and Colombia).

In summary, we have noted the determinants of training whereby we have divided our discussion into the characteristics of individuals who are likely to train and the characteristics of firms who will train.

On the whole, it is clear that education and training does indeed have a positive impact on individuals. There are also studies, which have provided insights into the characteristics of firms who would be more likely to conduct training, and there are also studies conducted to find who are the likely ones to receive training in companies that do conduct training. While the rate of return to education studies are many in both the developed and developing countries, it is unfortunate that there are not many studies on training for developing countries. The findings discussed here are mainly from studies conducted in the United Kingdom and the United States. This is an area of research that needs to be expanded especially among the developing countries. The rate of return estimates can be a powerful indicator to use in designing policies not only on the area of education and training but in other aspects of an economy such as wage inequality issues and so on. Although these rate of returns to education and training estimates are not sole indicators for both the individual and society, it could be used alongside other individual and social indicators of a country in policy making.

In expanding the venues of research on education and training, one could look into the type of skills that a worker could acquire and the consequences of returns on that type of skill. A growing skills market amidst globalisation and the move to skilled-biased technology paves the way for more in-depth research into the skills that are obtained via the education and training process. For example, in a 1998 paper, Green (1998a) found that "key skills" were becoming more important. In his study entitled 'The value of skills', he found that having computer skills increased the value of a worker by 20 percent. This study also confirms that transferable skills acquired do indeed allow a worker to demand for higher pay. Other skills found to have a positive impact on pay are professional communication and problem solving skills (which also indicates that skills are not confined to technical skills but encompasses personal attributes of an individual). It is not just a matter of stopping at finding if the impact of training is positive or possibly zero or negative but there are possibilities of further research into the issue of skill attainment due to the education and training that is received.

4.4 WHAT IS THE UNDERLYING STORY?

So, what do we find by conducting this review of studies on education and training? Firstly, we find that at the macro level, growth economist have found a positive link between the growth of human capital and the growth rate, with decreasing returns to human capital, as predicted by the theory of diminishing marginal product. Secondly, the emergence of the new growth theory has found that there is a positive link between the stock of human capital and the growth rate of a country. There is also evidence to show that human capital complements physical capital with the effects of human capital taking place via R&D activities. This finding that human capital complements physical capital via R&D could provide interesting discussions pertaining to the application of such a finding to developing countries.[97]

We have also seen that the human capital factor should not just be limited to the amount of formal education that a person gets but should encompass other factors such as work experience, training, health improvement and the quality of formal education. While it would be ideal to include all of these factors into a study examining the contribution of human capital to economic growth, there are limitations to achieving the ideal condition. The main conclusion that we draw from these studies is that there is a positive link between human capital and the economic performance of a country.[98]

Thirdly, at the micro level, education has been found to have a positive impact on the individual via the significant and positive effect it has on wages. Fourthly, there are

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[97] This is raised based on the argument that R&D are weak in developing countries. Take for example, Malaysia, a middle-income country. Statistics show that Malaysia is not performing very well in terms of its R&D expenditures. In 1988, Malaysia had a total of 0.8 percent spent on R&D as a percentage of GDP. This figure was very low compared to other countries within the same income band, such as Taiwan, which had R&D expenditure as a percentage of GDP at 0.9 percent in 1984 and the figure for R&D expenditure was 2 percent as a percentage of GDP in 1988 in South Korea. Therefore, can this low R&D generate enough impetus for human capital to contribute to GDP growth as found by growth economists?

[98] We have not forgotten the Benhabib and Spiegel (1994) and Pritchett (1996) results. Even though weak linkages between human capital and economic growth were found in these two papers, the researchers, including those who had attempted to explain this weak linkage agree that human capital will and does have positive effects on a country's performance.

limited studies, which show that training has positive effects on a firm's productivity. Fifthly, studies have been able to identify those who would undertake training and/or those who would most likely be given training by their respective employers. These are the individuals who are likely to be given the opportunity to increase their skills level within the workplace and/or would have higher likelihood of investing time and money to improve their skills by undertaking training on their own initiative. Sixth, in addition to being able to identify the individuals who would most likely be trained by firms, there are also studies, which have been able to identify the characteristics of firms who are most likely to provide training to its employees. The seventh point to be highlighted is that the training provided and received by the identified *individuals is found to have a positive* effect on wages as well. The positive effects of education and training on individuals have been discovered via the rate of returns to education and training studies. Given these seven points, what is the underlying story in the Malaysian context?

In Chapter 2, Malaysia's educational attainment is on the increase as indicated in the Barro-Lee constructed educational data set. The statistics also reveal an increase in the expenditure on education throughout the seven Malaysia Plans. If this were the case, based on the findings of available macro-orientated growth studies, we should find evidence of a positive effect of investments in human capital and economic growth of Malaysia.

If we briefly examine the Malaysian labour market,[99] Malaysia faced a situation of high labour scarcity in the early 1990s. This shortage of labour impeded plans to move on to higher value added industrialisation. There was not enough skilled labour to meet the demands of rapid industrialisation and development, which picked up after the mid-1980 recession. Although the Malaysian data shows increasing educational attainment, according to Kanapathy (1999), Malaysia's overall education attainment is relatively low compared to many developed and developing economies. Kanapathy notes, *"one of the main reasons for the present skill shortages*[100] *is due to the delayed response to the human resource needs of the nation"*. She also goes on to note that the public sector is short in resources to enable them to expand education and training in Malaysia.

Enterprise training was also reported to be poor (and confirmed in Tan and Batra's study). This indicated a need for a more active role of the private sector in the area of education and training. The role of the private sector will be further investigated in chapter 8 of this thesis when we look into the implication of our empirical results on policies in Malaysia.

Our brief on-the-surface examination of the Malaysian labour market condition raises a few questions pertaining to education and training in Malaysia. How much is human

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[99] The Malaysian labour market issue will be expounded further in Chapter 8 when we discuss the implication of our empirical results on the labour market. We wish to use this brief preview to assist us in drawing out issues pertaining to the condition of existing empirical work on education and training in Malaysia.
[100] This skill shortage issue will be examined further in Chapter 8. Evidence pertaining to this issue will be presented in this later chapter.

capital contributing to economic growth in Malaysia? What did the rate of returns to education and training studies on Malaysia show? Also, what are the determinants of training in Malaysia? Who are those who will have a higher likelihood of receiving training in firms or companies that does provide training? Who are those who would be more likely to invest time and money in improving their skills? Why do some firms in Malaysia train and why do some of them not train? What are the returns to training to an individual in Malaysia?

We will attempt to use the existing literature on education and training that is available on Malaysia to help us answer the questions that we have posed. The literature that we choose to use are studies that are empirical in nature, i.e. studies which have applied data to the various economic models used to examine the impact of human capital on an economy.

4.5 EVIDENCE OF STUDIES ON EDUCATION AND TRAINING IN MALAYSIA

Macro level studies.

We begin this section by looking at the empirical studies conducted for Malaysia at the macro-level. In 1993, the World Bank used the growth accounting[101] method to examine

[101] The Cobb-Douglas production function as described in Chapter 3.

the role of investment, human capital, population growth and relative income for each of the High Performing Asian Economies, namely Hong Kong, Korea, Taiwan, Singapore, Indonesia, Thailand and Malaysia from 1960 to 1985. Primary enrolment and secondary enrolment in 1960 were used to represent the human capital factor. The primary enrolment in 1960 had contributed to approximately 63 percent of the actual growth rate for 1960-1985. In comparison, secondary enrolment in 1960 appeared to have contributed a smaller amount of 13 percent to growth in Malaysia.

Another macro-level empirical work on human capital contribution in Malaysia is a study by Rahmah (1998). Rahmah used the Cobb-Douglas production function method to calculate the contribution of capital, labour, human capital, exports and TFP to the Malaysian growth period of 1970-1996. Data was collected from various sources, i.e. secondary data extracted from Malaysia's Economic Reports, Central Bank (Bank Negara) reports, World Development Reports, Human Development Reports and the World Tables by the World Bank. The human capital variable was proxied by two measures. Rahmah used literacy rates and the Government's education expenditure to represent the human capital variable in her production function equation.

When human capital is measured by literacy rate, this human capital variable appeared to have the lowest proportion of contribution to economic growth out of the five growth contributing variables. Exports were estimated to have contributed the most with a share of 38 percent, followed by labour (31 percent). Capital contributed 22 percent and literacy rate indicated a contribution of 6 percent to the total growth in Malaysia. The remaining 2 percent came from the residual, TFP.

Given the low contribution of education (proxied by literacy rate) to economic growth, Rahmah deduced that human capital had not been fully utilised in order for it to contribute to the economic growth of the country. Using the findings in her study, Rahmah highlighted the need for more efficient use of capital and human capital and had made a note that the two inputs are complements. She noted that in order to ensure efficient use of capital and human capital inputs, technology that is allowed into the country should match the skills of labour in Malaysia. Rahmah had also called for more training to be provided for labour in order to be able to operate the new technology that is brought in.

This finding appears to provide little support for the findings found in the World Bank study. However, it could be argued that these two studies are not comparable due to the different time period under investigation, variables and measurement of the variables used in the two studies. The World Bank study used primary and secondary enrolment rates in 1960 to represent the human capital factor while Rahmah used literacy rates as a proxy to human capital in calculating the 6 percent contribution to human capital towards economic growth. On top of the criticism of weak comparing factors, one could also raise several debates regarding the use of literacy rates as a proxy for education. For example, literacy rates could be misleading if the rates are taken from a sample, which is urban skewed.

Rahmah had also used education expenditure to represent the human capital factor. However, she does not use the results from this regression to examine the contribution of each variable (i.e. capital, labour, education – measured by educational expenditure and exports) to economic growth. We performed the same method of calculation using Rahmah's regression results with education expenditure as a proxy to education. We find that education contributed 25 percent to growth while exports only contributed 11 percent to growth, a result in contrast to the one presented formally by Rahmah. Capital contributed 37 percent while labour contributed 47 percent to economic growth. The residual, which is usually deemed as a measure of total factor productivity, or technical change, which also takes into consideration the quality of labour and capital is found to be negative with education expenditure as a proxy to education. Hence, this does not seem to show that the results obtained by Rahmah is consistent, as the results appear to change when the different proxies are used as human capital measurements.

One could also question the R^2 results in Rahmah's models. They were extremely high and close to a perfect 100 percent. Rahmah obtained a R^2 of 99.6 percent in the model with literacy rates and 99.9 with education expenditure as a proxy of human capital. It would appear rather dubious that by using these 4 variables, they would be able to explain almost 100 percent of variation in real GDP. This raises the suspicion of the presence of spurious correlation, which occurs when economic time series data is used. Hence, although it does appear that education had contributed positively to economic growth in Malaysia, the magnitude of the effect of education on economic growth and the model used in Rahmah's study is questionable.

Micro level Studies.

Education.

Moving on to the micro level studies, we will firstly examine the rate of return to education studies in Malaysia. So far, to our knowledge, there are eight studies that have estimated the rate of returns to education in Malaysia. Most of these studies have utilised the human capital theory model or better known as the Mincerian Earnings Function to calculate the Malaysian rates of returns to education.

The first and most comprehensive estimates of the private and social rates of returns to education in Malaysia were obtained by Hoerr (1973) using the 1967-68 Socio-Economic Sample Survey of households. Among the five levels of schooling examined,[102] the internal rate of return (measured via the cost-benefit analysis) for the tertiary level

[102] The five levels of education are primary schooling level, Forms I-II, Forms III-IV, Sixth Form and University. It is odd that Hoerr appears to have omitted the Form V level from his secondary schooling level. There does not seem to be any explanation with reference to this level of secondary schooling.

(university) was the lowest at 11.4 percent while the Forms I-II secondary level of schooling was estimated to have an internal rate of return of 21 percent.

Another study was by Mazumdar (1981) using data from the 1970 Post Enumeration Survey (PES). This study however was limited to 8,095 urban male employees and the self-employed. In another study by the same researcher,[103] estimates of the rates of returns to education were obtained using data from the World Bank Migration and Employment survey (MES) of 1975. In this study, data from 1,889 male employees in 3 urban centres in Malaysia, i.e. Kuala Lumpur, Kuantan and Kota Bahru were used. These two data sets were limited in terms of its survey coverage. The 1970 PES contains a large sample of all urban areas in Malaysia while the MES was confined to the three towns (in three separate states) as listed above. The latter, however, is a more comprehensive survey as it contained additional information such as background variables and type of employer.

Mazumdar (1981) had also summarised a different study using the 1970 PES data. In this study by Anand (1983), the basic human capital earnings function was utilised and was modelled without any adjustments made for unemployment. Anand found that among male urban employees, an additional year of schooling increased the income of a Malay person by 14 percent, of a Chinese by 14 percent and of an Indian by 13 percent.

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[103] The results of Mazumdar's usage of the PES and MES data set are found in Mazumdar (1981).

Although Anand's regression equation had very good fits and explained about half the variance in earnings derived from the survey data, Mazumdar highlighted a few points for further investigations. They were: -

- Anand had not analysed the rate of returns to the different levels of schooling.
- In analysing the rate of returns at the different levels of schooling, a distinction needed to be made between those who have successfully completed a particular stage of schooling enabling them to obtain the relevant certificate and those who failed to do so.
- In the analysis of the effect of education on earnings levels, an attempt could be made to take account of explanatory variables that might influence the relationship between the two. These include the location of employment, the nature of their education experience (i.e. level of schooling and language of instruction) and demographic factors (such as race and age).

The avenues of research listed above led Mazumdar to reuse the PES data and from this analysis there was evidence of particularly high returns to education from completed educational phases after the primary level.

Later, using the more comprehensive data, i.e. the MES data set, Mazumdar applied the simple human capital model again but this time running a separate equation for the public and private sectors. In conducting this section of the research, the experience variables were replaced by the present age of the respondent. This was done, as there was a problem in the respondent's reporting of their age at which they had left school. The aggregated data showed that the age at which a significant proportion of the sample said they had left school were much higher than might normally be expected for given levels of schooling.

In Mazumdar's second study using the MES data, the results show that the educational dummy coefficients for his public sector regression to be higher than that obtained in the private sector regression. The returns increased as the level of education increased in both the regressions. If we interpret the coefficients as the average returns to education, we find that the tertiary level received the highest returns out of the 6 levels of education in Mazumdar's study. Mazumdar also concluded that education played a relatively large part in explaining earnings. In his results, the education dummies alone explained 57 percent of the variance for the public sector employees while the addition of the age and age-squared variables added another 10 percent to the R^2. For the private sector, thc corresponding percentages were 24 and 31.

However, as Lee (1980) notes, the data set, which Mazumdar used covered only recent school leavers and the respondents were concentrated within a very narrow age band of between 19 to 22 years. Also, his main research emphasis was on unemployment among young school leavers in urban Malaysia rather than the examining of the relationship between earnings and education.

In another study, the rate of returns to education estimates were obtained by Lee (1980) who had used his own self-surveyed data of a non-random sample of 1,179 private sector employees and 792 public sector employees in the Klang Valley. Lee's empirical results indicated the following.

- Education ranked as one of the most important variable in the explanation of earnings differentials.
- The low marginal rate of returns to lower secondary schooling had raised Lee's concern over the continued expansion of education at this level.
- In relation to the effectiveness of education as a policy variable for the reduction of inter-racial inequalities, Lee's results indicated that almost half of the inter racial earnings differential in the private sector may be attributable to discrimination which on the whole favours the Chinese over the Malays and the Indians. In the public sector, inter racial differentials are largely attributable to inter racial differences in earnings characteristics, in particular education.
- Lee's results show that while there was no strong evidence in support of a rigid segmentation of the labour market, there were significant inter racial differences in the impact of education on occupational status and occupational mobility, as well as in

the openness of their occupational structures which, in general, had tended to favour the Chinese.

There were another two studies by Lee (1989) and Lee and Sivananthiran (1992) respectively. The former study was a study of 2,553 employees confined to several key industries such as electronics & electrical, textile and apparel, machinery and engineering, wood based, rubber products, food processing, chemical products, transport equipment and services, mining and construction industries. This study was further confined to six key occupations, i.e. *electrical and electronic equipment assemblers, electrical fitters,* machinery fitters, metal formers, supervisors and engineering assistants.

The latter study was similar to the 1989 study where data from 1,445 employees in the manufacturing sector within the Kuala Lumpur urban labour market was used. The study covered nine industries similar to those in the above study except that the fabricated metal product industry replaced the transport equipment, services, mining and construction industries.

Results from these two studies are taken from Lee, et al. (1995). These two studies had obtained the rate of returns to education estimates for males and females in their selected manufacturing sectors. These two studies showed rate of returns to education estimates to be higher for males compared to that obtained for females. This result is in contrast to that generally found in international studies when analysing according to the genders.

Lee, et al. find that the overall trends of the rate of returns to education estimates from these six studies (Hoerr, Mazumdar's PES and MES studies, Lee's own study and Lee's collaborative studies with Sivananthiran) are: -

- There are increasing returns to education. Higher levels of education receive higher levels of returns. This was found in the majority of the studies.
- The rate of returns to lower secondary education was rather low but the rate of returns remained relatively high for the higher levels of education (i.e. the pre-tertiary and tertiary level).

In a more recent study, the rate of returns to education was rather dismal as found by Ruppert (1998). Ruppert obtained a rate of returns to education of 2 percent using a Malaysian household income data set. This rate of return was estimated via the usage of a model examining the determinants of earnings in Malaysia. We however, believe that the returns calculated here are biased due to the nature of Ruppert's study, which was concentrated on managing foreign labour in Malaysia. In addition, due to the nature of her study, Ruppert's model included controls on occupation, which if used in estimating the rate of returns to education would bias the results by removing cross-occupation mobility effects (Sapsford and Tzannatos, 1993).

Training.

The above section has detailed the eight studies that we know of related to the returns to education in Malaysia. We proceed to examine the training studies that are available on Malaysia. Studies on training in Malaysia include a report submitted by Lee (as quoted in Lee, et al. (1995)) to the ILO and the Government of Malaysia in 1989. This study found that returns to certificate level training obtained from private institutions tended to be higher than the premium for certificate level training obtained through government institutions. This finding provided support to the government's stand to encourage the development of private institutions providing training. However, this study did not cover other training types such as on-the-job training that is provided by both public and private firms.

Another study in the area of training for Malaysia is a study by Wan Abdul (1995) using data collected in 1993. By conducting a qualitative survey via administration of a questionnaire on a sample of 60 randomly selected manufacturing firms, Wan Abdul found that: -

- Transnational Corporations (TNCs) have a greater incidence of training and re-training their work force. This training was provided to production workers, skilled workers and management staff.

- TNCs were also found to be more successful in retaining trained workers through re-training programmes, better pay schemes, promotions and career advancement prospects.

Wan Abdul also found that the general level of technical and industrial skills in Malaysia was relatively low even though there were incidents of increased training and skill acquisition among the workers in the firms interviewed. He also discovered that firms had reported an acute shortage of both skilled and unskilled workers at that time and the TNC's commitment towards local R&D were found to be low. This low R&D commitment had spillover effects on the technology transfer process, which subsequently affects training and re-training programmes.

Tan and Batra (1995) echoed some of the findings discovered in Wan Abdul's study. This study by Tan and Batra was a more comprehensive and detailed study on enterprise training in Malaysia.[104] By using a probit model, training conditions among 2,200 firms surveyed in Malaysia were analysed. Their study showed that the following firms in Malaysia were more likely to conduct training.

- All firms regardless of size were likely to train. Small firms (defined as those with 16-100 workers) were more likely to conduct internal training programmes than external training programmes. When compared with the medium (defined as those

[104] A separate country report (see World Bank 1997) was also produced based on this multi-country study.

with 101-250 workers) and large firms (defined as those with more than 250 workers), the coefficient on training in the probit model was lower for the small firms. Small firms were also more likely to only train skilled workers while both the medium and large firms were likely to conduct training for both the skilled and unskilled workers.

- Firms with a more highly educated workforce have a greater likelihood to conduct any formal training.
- A similar outcome, i.e. the greater likelihood of formal training was found among firms with a higher proportion of skilled labour.[105]
- Firms with a higher percentage of automation were found likely to conduct external training programmes.
- Firms practising quality control measures were also likely to train.
- The union effect found in Malaysia was in contrast with theoretical reasoning that unions are thought to reduce the likelihood of training.[106] The union effect on training in Malaysia was positive. Unionisation had a stronger effect on external training compared to in-house training and also had a better effect on skilled worker training.

[105] Skills were measured as the percentage of share of managers, engineers, technicians, supervisors and skilled production workers in the total work force of the firm (World Bank, 1997).
[106] This was the theoretical view taken by Tan and Batra. This view is in contrast with the other side of the theoretical view that trade unions do increase training possibilities through an increase from the voice effect of unions. There is empirical work in the UK to show that in environments where trade unions were recognised, employers were more likely to receive training then their non-unionised counterparts (Heyes and Stuart (1998)).

- Firms with higher investments in R&D had a significantly higher likelihood of enterprise training.
- Foreign owned firms were also more likely to conduct training both internally and externally. The findings also revealed the export variable to be positive but insignificant in Malaysia. This was in contrast to the results of the other 4 countries in the survey (i.e. Taiwan, Mexico, Colombia and Indonesia) where firms, which were export-orientated, were associated with a greater likelihood of enterprise training (the export variable being significant).

This World Bank study appears to have found Malaysia performing relatively well in terms of its incidence of enterprise training among the 5 countries investigated. The incidence rate of informal training among firms in Malaysia was the highest among 4 of the countries (83.1 percent compared to 11.3 percent in Mexico, 18.5 percent in Indonesia and 75.9 percent in Colombia, data on Taiwan was not available). Malaysia came in second on the list when considering formal training from any source with an incidence rate of 34.7 percent compared to 49.6 percent in Colombia, 18.9 percent in Indonesia, 10.8 percent in Mexico and 9.3 percent in Taiwan.

Tan and Batra had also examined the effects of training on firm-level productivity using an augmented Cobb-Douglas production function model with the logarithm of value-added as the dependent variable. The right hand side variables used were the logarithm of capital and labour, a measure of training and a vector of control variables. Four training measures were examined; a) training as an indicator variable or dummy variable, 1 if the employer provided any formal training and 0 if otherwise, b) A predicted value of training, whereby an instrumental approach was taken by Tan and Batra in an attempt to correct for selectivity bias in training, c) training distinguished between that provided to skilled and unskilled workers and d) a further disaggregated measure of training whereby consideration was given to the different types of training, i.e. internal or external and worker type, i.e. skilled and unskilled.

The results of this exercise showed that the training dummy variable was positive but insignificant. Colombia joined ranks with Malaysia, as the Colombian training indicator was also positive but not significant. When corrected for selectivity, training was found to be positive and statistically significant both in Malaysia and Colombia. Formal training for the skilled workers was found to have a positive and significant effect on Malaysian firm-level productivity. When disaggregated to consider the impact of the type of training, only the skilled and internal formal training variable out of the 4 training variables[107] used had a positive and significant effect on firm-level productivity.

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[107] The 4 training variables were skilled workers and internal formal training, skilled workers and external training, unskilled workers and internal formal training and unskilled workers and external formal training.

The effects of training on productivity level were further examined by each individual source of external training. In Malaysia, internal training and external training for skilled workers provided by industry associations were positive and statistically significant. Only training provided by universities/colleges for unskilled workers displayed a positive effect (but insignificant) compared to any other source of training (i.e. Government training, industry association training, training by external buyers and supplies and other external sources). Government training for both the unskilled and skilled workers were found to have a negative effect on firm-level productivity (however, this variable was not significant).

From this analysis, it appeared that training for skilled workers had a larger positive impact on productivity compared to training for unskilled workers. It also showed that the training from the private sector for skilled workers had higher positive effects on productivity than training provided by the government. When distinguishing between in-house/internal and external training, in-house training appcared to be more beneficial than external training.

4.6 SUMMARY

This chapter contains a review of existing studies on the contribution of education and training to economic growth, the individual and firm for both Malaysia and other countries. In section 4.4, we raised questions pertaining to the education and training scenario in Malaysia based on our review of some of the existing studies on education and training in other countries. Do the existing empirical studies on education and training in Malaysia provide answers to these questions?

The first question raised was how much is human capital contributing to economic growth in Malaysia? On the whole, education and training appear to have positive effects on Malaysia. At the macro level, evidence of this positive impact can be seen via the two studies (i.e. the World Bank (1993) study and Rahmah (1998)) that is available. However, a concrete measure of the share of education to economic growth cannot be determined due to the discrepancies in the results between the two studies and in the second study, the results had raised doubts, which discredits the results of a positive but low impact of human capital on Malaysia's economic growth.

We then asked, what did the results of the rate of returns to education and training studies show? We examined the studies and have established that the results had indicated that there was higher rate of returns to the higher levels of education. This result suggested the possibility of continued relative scarcity of skilled and high level manpower in the labour market. This deduction made in relation to the labour market was derived based on the studies summarised in section 4.5. These studies were conducted using data from the 1970s and 1980s. The results extracted from these studies appear to imply that there were possible labour shortages in Malaysia. We will revisit this finding in Chapter 8 when we apply a political economy model analysis for Malaysia. We think that it would be interesting to see how the rate of returns analysis can be used within the Malaysian skill formation context.

The evidence in Malaysia also points to the rate of returns to education being lower for females compared to the males. This is in contrast to the rate of returns to education findings in other countries, especially that found among the developing countries. In Lee and Sivananthiran's 1992 study, the rate of returns for females were lower than the rate of returns for men especially at the certificate/diploma and degree level. This indicated that the females in the manufacturing firms investigated by Lee and Sivananthiran were not benefiting as much from their education compared to their male counterpart. Lee, et al. suggested that this occurred because women have a tendency to specialise in clerical, secretarial and bookkeeping fields while men tended to specialise in the professional and technical fields. It is this latter group of workers that is usually faced with shortages in the labour market. This shortage notion could well increase the premium within these professions. Even though this may be the case for the lower rate of returns estimates, these results could signal some setbacks for the women to take part in the labour force (or even education for that matter) if they are not going to receive the appropriate returns to education.

Another issue pertaining to the rate of returns studies in Malaysia is that even though Lee, et al. has considered these studies to be comparable to each other, we ought to note that they do differ in two ways. They differ by the coverage of the samples and they differ by the number of independent variables included in the earnings function (Lee, et al. (1995)). By being different due to these factors, it would not be accurate to make a deduction on changes of the rate of returns over time. For example, we will find that there was a drastic drop in the rates of returns (especially at the lower secondary and upper secondary levels of education) between the study by Mazumdar using a 1975 data set and the one by Lee in 1980 using a 1978 data set. As these studies used different samples and had used different variables to obtain the rate of returns, it would be incorrect to conclude that returns to education were decreasing over time.

We also find that the studies on the rate of returns to education in Malaysia are outdated. Moreover, some of the samples used in some of the studies are confined to a certain group of the Malaysian population and hence do not provide estimates for the whole of Malaysia. The analysis differentiating between males and females is not complete, especially in the estimates of returns to education for females.

Given the vast and potential usage of the rate of returns to education estimates, it would be deemed important and useful if a more comprehensive and updated rate of returns to education study on Malaysia were to be carried out. A more comprehensive and updated study on the rate of returns to education could help determine if there was still a situation of higher returns to higher levels of education as found in the previous studies. The results could also be used for better educational policy to be derived and better planning to be carried out, both for the government and the private sector.

Although there is a more recent estimate of the rate of returns to education through Ruppert's study, this estimate is again not accurate based on the fact that it is calculated using household income data and it has not consider estimations for the different levels of schooling. We have also noted the other shortcomings of this study, i.e. biased results due to the specification of the earnings equation used to meet the objectives of her study.

The last set of questions raised were to do with training, what are the determinants of training in Malaysia, i.e. who are those who will have a higher likelihood of receiving training in firms or company that does provide training? Who are those who would be more likely to invest time and money in improving their skills and what are the returns to training of an individual in Malaysia?

The study by Tan and Batra does provide some of the answers to these questions. For instance, their findings show that education is an important factor both to firm-level productivity and training. The likelihood of training increases in firms with a larger educated workforce. This shows that the level of education and training are complements and they can both lead to higher firm-level productivity (as found in the other country studies as well). Their study also shows that firms in Malaysia have a high incidence rate of informal training and formal training compared to the other countries investigated in the study. The study has also shown that all firms in Malaysia do train, regardless of the size of the firm.

Additional analysis also indicates that skilled workers are benefiting more from any formal training that is given compared to the unskilled workers. Tan and Batra's findings also reveal that external training for the unskilled workers does not contribute to firm-level productivity. This could bring forth a need for further investigation into the training of unskilled workers. Also highlighted is the negative effect of government training on firm-level productivity for both the skilled and unskilled worker.

These results revealed by Tan and Batra's study allows companies to examine and revise their corporate strategies for productivity growth and international competitiveness (Tan and Batra, 1995). It could also provide sufficient information to the government in providing incentives to firms to encourage training and to also allow for better planning of policies in monitoring the skills market in the labour force. With the additional analysis on the various sources of training, this finding could provide indications of the efficiency of the different sources of training.

Having reviewed the studies on training and acknowledging that the findings from existing studies could be beneficial both to firms and the government, we however find that there aren't any studies investigating the benefits or impact of training for the individual. There are also no studies to identify who are those who would be more likely to receive or participate in training of any form. While we are able to identify firms who are likely to train their employees, we have no information on who are the ones who will likely train or who are likely to be trained. Hence, the picture of the training condition in Malaysia is not complete.

4.7 CONCLUSION

Combining the deductions that we have of the education and training studies in Malaysia, we find that there is a need for further research into both the area of education and training to ensure that education and training can continue to work together for the benefit of the nation and the people of Malaysia. To reiterate the needs: -

- The returns to education estimate both at the macro and micro level in Malaysia needs to be updated. The macro level estimates are potentially flawed while the last comprehensive micro level estimate of the returns to education was published in 1973 (The study by Hoerr (1973), using a 1967/68 data set).
- The inconsistent results between the Malaysian situation (i.e. returns to education for females are lower than the returns to education for males) and international

studies[108] (i.e. returns to education for females are higher than the returns to education for males) garner reasons for new results to confirm this finding.

- The returns to education indicate that there are higher returns to higher levels of education in Malaysia. Is this possible given that internationally found results reveal primary level schooling to have higher returns? The current studies that are available do not address this issue.
- The current set of returns to education studies is not comparable over time.
- Within the training issue, we have no estimates of the gross returns to training in Malaysia.
- We also do not have a set of the determinants of training, which will give us the characteristic of individuals who are likely to have received training.

This thesis aims to rectify the Malaysian micro level research needs listed here above. We have opted to take this thesis from the micro point of view, as we are not confident that there is a ready set of macro level data to help us update the macro level findings. We believe that the data that is available will be insufficient to help us draw robust conclusions on the impact of education and training in Malaysia at the macro level.[109]

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[108] The exception is the study for Singapore by Phan (1995).

[109] Heng and Siang (1999) and Felipe (2000) are two studies that have included Malaysia into their cross-country analysis. However, we think that it would be difficult to draw out specific policy implications pertaining to human capital development for an individual country out of the results obtained through these cross-country studies.

Given our believe that the aggregate data available for Malaysia will be weak, we think that this factor will only exacerbate the problems found within the macro level models.[110]

In addition, we have been given access[111] to a reasonably comprehensive set of micro level data, which we deem will be able to allow us to meet the remaining needs listed above. The next chapter will begin the quest of this thesis in identifying the role of education and training in the Malaysian economy.

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[110] When this occurs, the results obtained would only be biased further.
[111] This was made feasible via help from the Malaysian Government.

CHAPTER 5

THE MALAYSIAN FAMILY LIFE SURVEY THE RATE OF RETURNS TO EDUCATION AND TRAINING

5.1 INTRODUCTION

This chapter will contain findings from an analysis conducted to achieve a two-fold objective. These objectives include (i) obtaining estimates of the rate of returns to education and training in the 1980s and (ii) identifying the characteristics of individuals who are likely to train. These objectives have been designed to close the gap in the information and knowledge of the education and training condition in Malaysia as listed in the conclusion of the previous chapter.

Both these objectives will be achieved by using data collected in the 1970s and 1980s. The characteristics and contents of these data sets will be described in detail in the next few sections of this chapter. The methodology adopted for the rates of returns analysis is the human capital earnings function, better known as the Mincerian Earnings function, as described in Chapter 3 of this thesis. The determinants of training will be analysed with a conventional probit model. Section 5.1.1 will provide brief details of the models used.

5.1.1 Model

In chapter 3, the basic Mincerian Earnings Function is quoted as

$$\ln Y_i = \alpha + \beta S_i + \gamma_1 EXP_i + \gamma_2 EXP_i^{2} + \varepsilon_i \tag{5.1}$$

where Y_i is earnings, S_i is the number of years of schooling of individual i, EXP_i and EXP_i^2 are years of experience and its square.

For this analysis, the following model of the Mincerian Earnings Function will be used. Earnings are determined according to: -

$$\ln Y_i = \alpha + \beta Q + \gamma_1 AGE_i + \gamma_2 AGE_i^{2} + \delta T_i + \varepsilon_i \tag{5.2}$$

where Q is a vector of dummy variables of the individual schooling levels and other variables deemed to have an influence on earnings. T is a 0/1 dummy variable measuring training experience.

The determinants of training experience are estimated in a conventional probit model:

$$T^* = \alpha + \mu X \tag{5.3}$$

where T^* is a latent variable measuring the value of training, such that $T=1$ if $T^*>0$ and $T=0$ if $T^*\leq 0$. X is a vector of the determinants of training.

Before proceeding to the results, the next section will discuss the data sets that we will use in this analysis.

5.2 THE MALAYSIAN FAMILY LIFE SURVEYS

The data set mentioned in the introduction refers to the Malaysian Family life surveys. The Malaysian Family Life Survey (MFLS) consists of two sets of data,[112] the first was collected in 1976 and the second in 1988. The mastermind behind the Malaysian Family Life Survey is RAND, a non-profit organisation in the United States. The first Malaysian Family Life Survey (MFLS1)'s main objective was to obtain data to estimate the magnitude of key economic and biomedical relationships affecting birthspacing, family size and breastfeeding patterns of families in Peninsular Malaysia. From the objective, it may sound odd at the first instance that such a survey could provide insights into an economic research.

However, the data that is collected in the MFLS is so rich that it has not only allowed intergenerational studies to be conducted but has also attracted many researchers to look into other aspects other than fertility issues, such as migration, education, labour market, income distribution and so on in Peninsular Malaysia (For example, see DaVanzo & Kusnic (1983), De Tray, (1984, 1985,1988), Blau (1985), Rosenzweig and Schultz (1987), Lee & Willis (1994), Pong (1996, 1997)).

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[112] The documentation and data sets are available at http://www.icpsr.umich.edu/NACDA/SERIES/rand.html.

The second Malaysian Family Life Survey (MFLS2) is a follow-up to MFLS1 and had similar objectives to the first MFLS1. The surveys were only conducted in Peninsular Malaysia, where the majority of Malaysians live. In 1975, 85 percent (Malaysia, 1976) of the total population of Malaysia lived in Peninsular Malaysia while in 1988, 83 percent of the total Malaysian population resided in Peninsular Malaysia (DaVanzo and Haaga, 1999c). We will look briefly into each MFLS, to provide the readers with a background to both the surveys.

5.2.1 First Malaysian Family Life Survey (MFLS1)

The MFLS1 was jointly conducted with a private market research firm in Peninsular Malaysia, Survey Research Malaysia (now known as ACNielsen Malaysia) and was conducted in 1976-1977. Fieldwork was administered in three rounds, with each round being separated by a four-month interval. The main respondents in the MFLS1 were randomly selected ever-married women (EMW) under the age of 50. Additional respondents included the spouses belonging to the EMWs. There were 11 sets of questionnaires, each directed either to the EMW or to her present husband. Each questionnaire covered different issues and was administered in different rounds. The table below shows the various questionnaires administrated.

Questionnaire Label	Information collected
MF1	Household Roster – this questionnaire records the demographic characteristics of all persons living in the household
MF2	Female Retrospective – elicits information on the EMW's life history, e.g. education and training, work history, etc. Information collected covers the time since the respondent was 15 years old, or age at first marriage or age at first pregnancy, whichever was earliest.
MF3	Male Retrospective – similar information (with the exception of questions not relevant to the males, e.g. pregnancy issues) as collected in the MF2 but this questionnaire was answered by the EMW's present husband.
MF4 and MF5	Female and male time budgets, i.e. collecting information on how time was spent by the EMWs and husbands on market and non-market activities (e.g. unpaid family work, child care, schooling, training, and so on– excluding recreational activities and sleep)
MF6	Income and Wealth – This questionnaire gathers all information on all income except that covered in MF4 and MF5.
MF7 and MF8	Male and Female attitudes and expectations – information such as expected occupation and educational attainment of children, help that they expect to receive from their children, etc

Questionnaire Label	Information collected
MF9	Network of support – contains information on the flow of goods, help and money (including loans) between respondents and their relatives, friends and acquaintances
MF10	Migration – determines the extent of geographic mobility of the EMWs and her family.
MF11	Community questionnaire – Administered on a variable number of spokesmen/women (e.g. Village head, midwives, etc) in each community to elicit information regarding the job market, job training programmes within the community.

Source: Butz and DaVanzo, 1998a

In this study, data collected from MF1, MF2 and MF7 will be used.

5.2.2 Second Malaysian Family Life Survey (MFLS2)

The second MFLS was fielded in 1988, a joint effort between RAND and the LPPKN (the National Population and Family Development Board of Malaysia). The MFLS2 differed from the MFLS1 in terms of the new samples introduced in MFLS2, lesser questionnaires and extra information collected on certain issues such as training. The table below lists all the questionnaires administered in MFLS2.

Questionnaire Label	Information collected
Tracking	Household tracking – administered to ALL households where an interview was attempted.
MF20	MFLS1 Roster update – contains current information of all household members interviewed in MFLS1.
MF21	1988 Household Roster – all demographic characteristics of households interviewed in MFLS2
MF22	Female Life history (similar to MF2 in MFLS1)
MF23	Male Life history (similar to MF3 in MFLS1)
MF24	Senior Life history – used on the Senior Sample introduced in MFLS2.
MF25	Household Economy – Current sources of income, household possession, ownership and expenses.
MF26 and MF27	Community data

Source: DaVanzo and Haaga, 1999a

In terms of the survey samples, there were four samples in the MFLS2. They are: -

i) The Panel Sample contains data from the re-interviewed women from MFLS1 in MFLS2. A follow-up rate of 70 percent was achieved, i.e. 889 out of the total 1262 women interviewed in 1976. The husband belonging to the woman interviewed was re-interviewed as well.

ii) The Children Sample. This sample contains data of grown children belonging to the women in the Panel Sample. The children were selected at random and up to three children were interviewed. The children interviewed were aged 18 and above.

These two samples using only the women information were combined and will henceforth be known as the Panel and Children[113] Sample and are used in the analysis to be discussed in section 5.5.

iii) The new sample was a sample introduced in MFLS2. This new sample consisted of women aged 18 to 49 years old and these women were randomly picked regardless of their marital status (the Panel Sample contained ever-married women only). If the women were married, their husbands were also interviewed.

For this analysis, we will only use the women data found in the new sample. We label this sample as the New Sample. We have not pooled the new and panel and children sample because the samples were selected under different designs. The Panel Sample was selected randomly in 1976 to reflect the population of women in Peninsular Malaysia in

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[113] In this sample of women that are used, there are a total of 25 women who were not randomly selected. These 25 women consist of wives belonging to the interviewed male child of the panel sample women and sisters of the panel women, who were proxies in answering the questionnaire in the absence of the panel women in the household or in the case where the panel women was unable to complete the questionnaire. However, the differences between the results of a purely random sample of the women and the results, which include the 25 non-random women, are small and insignificant. Due to this and to maintain an appropriate sample size for analysis, the non-random women have been included into the sample for analysis.

that year while the 1988 New Sample is representative of the 1988 household women population.

iv) Another sample introduced in the MFLS2 is the Senior Sample. This is a sample of households with a person aged 50 or older.

As this was a retrospective survey, one may have doubts about the data quality collected in such surveys. In the case of the MFLS2, Sine (1991) assessed the MFLS2 data and found that the,

> "MFLS-II data is of very high quality. It performs well on test of internal consistency and it is at least as good, and sometimes better, than other data it was compared to".
>
> Sine (1991)

5.2.3 Third Malaysian Family Life Survey (MFLS3)

There were plans to conduct the Third Malaysian Family Life Survey (MFLS3) in the year 2000. However, we have been informed[114] that these plans have been postponed indefinitely.

To meet the objectives of this research, this chapter takes the opportunity to analyse and use the information on training and education collected in the MFLSs to derive results, which will be able to explain the condition and returns to education and training in

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[114] We obtained this information via electronic mail communication with Ms. Julie DaVanzo, co-ordinator of the MFLS3 at RAND and Director of RAND's Centre for the Study of the Family in Economic Development.

Peninsular Malaysia during the survey periods of 1976-1977 and 1988-1989. The next section will discuss the training variable that is available in the data set. The fourth section provides details of the other variables taken from the data set. Section 5.5 and 5.6 will look into the analysis and results of the regressions and section 5.7 will conclude.

5.3 THE TRAINING VARIABLE IN THE MALAYSIAN FAMILY LIFE SURVEYS

One of the variables collected among the work and education variables was information on training. This added to the usefulness of the MFLS data set, as training information in Malaysia is limited. Data on training have only been collected by individuals (e.g. Wan Abdul Aziz (1995)) or the government on an ad-hoc basis. Although Malaysia does have a Labour Force Survey (LFS), which is conducted annually and is combined once in every two years with the Household Income Survey, we find that the information collected in the LFS is confined to labour market issues such as unemployment and underemployment while the household income survey covers other aspects of living, e.g. migration, utilities, transportation, education but no specific section or questions pertaining to training.

In addition, research findings and data used from these individual studies are limited to certain industries. For example, the Wan Abdul Aziz study concentrated on industrial training in the manufacturing sector while another study by Lee (1989)[115] was confined to analysing the returns to certificate level training obtained through private institutions and public institutions.

Hence, the data collected on training in the MFLS provide a good base for the analysis of returns to training for a larger coverage (i.e. females and males from all lifestyles) of a majority of the Malaysian population. Although the available data may not be as comprehensive and updated as desired, the information that is available on the MFLS is nevertheless interesting and useful.

In the MFLS1, the following questions were asked pertaining to training (in MF2 and MF3).

"Since your 15th birthday have you attended any job-related training programmes or courses? By that, I mean any special study either at your place of work or elsewhere to help you with your job or occupation. (INCLUDE ON-THE-JOB TRAINING).

Prompt: Please include any periods of job-training you had while you also were attending school/college/university or any period of training or apprenticeship while you were working?

If yes, the respondent was then asked:-

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[115] As quoted in Lee, et al. (1995).

a) In what year did you begin your ______ (first, second, etc.) training programme? In what month? How old were you then?

b) In what year did that _______(first, second, etc.) training programme end? In what month? What was your age then?

c) Did you attend that training programme full time? If no, how many hours a week did you attend?

d) Did you attend any other job-related training programme after that?"

In the MFLS2 questionnaire, questions relating to training were as follows: -

"Have you ever attended any job-related training programmes or courses? By that, I mean any special study either at a school, a shop, your place of work or elsewhere to help you with your job or occupation.

(PROBE): Please include any periods of job training you had while you also were attending school/college/university or any period of training or apprenticeship while you were working.

If yes:

a) How many job-related training programmes have you taken part in?

I'd like to ask you about (each of your/IF MORE THAN TWO: your two longest) training programmes. Let's start with the longest one first.

FOR EACH PROGRAMME

c) What type of training was that? (Probe: Was it at school or provided by your employer?)

d) When did you begin that programme? (How old were you then?)

e) How long did that programme last?

f) Did you attend the programme full time or part-time?

g) If part time: How many hours a week did you attend?

h) Who paid for your job related training?"

(Note: Question g was missing from the questionnaire made available on the web, hence it may not be exactly as it is on the original questionnaire)

5.4 VARIABLE DEFINITION AND DESCRIPTION.

The definition of the variables based on the instructions given to the interviewers is listed under this section.

Earnings

The interviewers were given instructions to record earnings as income minus all expenses. However, in the case of an individual being an employee, the interviewers were given the instruction that earnings should be how much the individual has earned over the last 12 months. Hence, it appears that the 'net'[116] earnings instruction was more applicable to individuals who had their own business or farm. The instruction given with regard to this group of people were *"If the person runs a business or farm, or earns an income from fishing, we are interested in how much he/she has left after paying for their business, farm or boat expenses, (i.e. expenses for equipment, any wages for helpers, rent, gasoline, etc)."* In the case of an individual running a shop, profits earned were taken as earnings.

In addition to earnings received, information on in-kind payments was also collected. In-kind payment could refer to tangible assets such as a house or other in-kind payments such as meals, clothing and/or shoes.

In Chapter 3, the discussion on "pay" as a dependant variable highlights that it is theoretically argued that pay should be total earnings, i.e. earnings which includes fringe benefits and all other aspects of pay. Admittedly, the earnings figure that we obtain from the MFLS would not reflect all the fringe benefits that an individual receives in addition to the monetary earnings. Nevertheless, given the information in the MFLS data sets, we will be able to capture other aspects of pay by including the in-kind payment and other bonuses or gratuity received due to the nature of the work that is undertaken.

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[116] Income taxes have not been deducted from the income data. Hence, the 'net' earnings here are not entirely clear of expenses.

Therefore, total income is derived by adding up the total earnings and all other payments, i.e. in-kind payments and bonuses and/or gratuity that an individual may have received in the past 12 months of work. Work here refers to the main income producing activity, which the individual had done in the past 12 months. The survey showed that 29 percent of the respondents in the Panel and Children sample were multiple jobholders while 24 percent of the new sample respondents were multiple jobholders. Thus, in the income date file, one would find that a given individual might have several income earning activities listed. While combining all records would be ideal, we would then be unable to identify the occupation of the respondent.

After having done a random check of the multiple records, the first income producing activity was found to have more hours worked per week than the subsequent records of income earning activity, indicating that it was the main work that the individual was doing. Based on this, all duplicates in the income data file were identified and dropped, keeping records of first occurrences only.

The total income is then calculated as weekly income. This was done as the survey had information on the number of weeks that the individual had done for that particular work. This allowed the calculating of a standardised measure of income, regardless of whether the individual had reported their earnings by month, year or even by day (here, the assumption that an individual works 8 hours a day on average is used) to the interviewer.

The calculated logarithm values of income (LNINC) are finally used as the dependent variable.[117]

The right hand side variables of the equation are: -

a) AGE and AGE^2

These two variables are very common proxy variables used to measure work experience. We have chosen to use these proxies for actual experience to avoid the repercussion of any possible inaccuracies generated from the calculation of potential experience. AGE^2 shows diminishing returns deriving an inverted "U" curve when plotting a graph for income against age. One should expect a positive sign on the AGE coefficient and a negative sign on the AGE^2 coefficient.

b) Education levels (EDUCERT)

Five groups of education levels have been created based on information given to the question pertaining to the highest certificate/diploma received. The five levels are as listed in the table below.

[117] We find that there was a large number of missing values in the earnings component in our final sample. This is probably inevitable in surveys where respondents may be unwilling to disclose specific information

Variable	Education Level	Highest Certificate Received
PRIM	Completed Primary Schooling	None
LOWSEC	Completed Lower Secondary Schooling	SRP (Lower Certificate of Education)
UPPSEC	Completed Upper Secondary Schooling	SPM (Malaysia Certificate of Education) or SPVM (Malaysia Cert. of Vocational Ed.)
PREUNI	Completed Pre-University	STPM (Higher School Certificate) or a Diploma or certificate from college
HIGHED	Completed Higher Education	Bachelors, Masters or PhD or other doctorates

c) Hours worked per week (LNHOURS)

This variable used is the logarithm of the number of hours worked per week (LNHOURS). The number of hours worked per week is average hours worked per week for respondents with invariable working hours per week. For those who had variable working hours, the respondent had to give the interviewer an estimate of the average between hours during a busy week and a slow week. One would expect a positive correlation between this variable and the log of earnings.

d) Marital Status (MARRY)

We will use a dummy variable to depict the marital status of the women. A 1 dummy will be given to those who are married and a 0 dummy, if otherwise. An individual is considered as not married if she is single, separated, divorced or if she is a widower.

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on money matters, e.g. earnings or income to the interviewers.

e) Training (TRAIN)

Training was defined to the interviewers as a job-related training course held either at the place of work or elsewhere that lasted for at least one week, i.e. 5 working days. Examples of training listed in the interviewer's instruction manual were apprenticeships and vocational training, pre-service training which included military training, and so on and other pre-service training which lasted for less than 2 years, in-service training such as management and supervisory training and other training courses that a person attended while working. The TRAIN variable is a dummy variable created based on the respondent's answer to "How many job-related training programmes have you taken part in?"(NTRAIN).[118] One would expect a positive training coefficient in the results of the regression.

f) Employment Status

In the survey, there were paid employees, the self-employed/own account worker, employers and unpaid family workers. The definition given to each employment status is as follows: -

[118] We were not able to use the respond from the question "..have you attended any job-related training programmes or course?..." as the answer to this question appeared to have been used as a screen to determine if the respondent had training experience and hence was not coded.

Paid Employee: (EMPLOYEE) A person who works for a private employer or in any branch of government for wages, salary, commission, tips or pay in kind. Includes persons working for pay in other private non-profit organisations.

Self Employed/Own Account worker: Persons who work for profit or fees in their own business, farm, shop, office and so on and do not employ others to help them.

Employers: An employer is a person or a group of person who runs an enterprise (which may be self-owned or otherwise) and employs one or more persons to help run the business.

Unpaid family worker: (UNPAID) Persons who works for no pay on a family farm or business. Room and board, food and a cash allowance are not counted as pay for family workers.

As the employers and self-employed carried similar definitions, they have both been combined to form EMPLOYER to allow for a robust number within the employer cell.

g) Race Variables

The three race variables are MALAY, CHINESE and INDOTH. These are 0/1 dummy variables indicating the race of the individual women. The Indians and the other races are combined to form INDOTH. The other races consist of Europeans, Thais, Burmese, Filipinos, Arabs, Persians, etc. The MALAY category is the reference category when analysing the race variables.

5.4.1 Extended Training Variables

In the 1988 MFLS, respondents were asked further questions based on their first and second longest training programme. We will analyse the data for the first longest training, as we would be able to capture all those who had training experience (i.e. TRAIN=1).

Out of the six questions relating to the first and second longest training programme, the following variables were created and used in the regression analysis.

i) Type of job-related training programmes

1. Business, secretarial or technical school (Offered by Private schools)
2. Company training - training programmes attended while working in a company or in the private sector.
3. Apprenticeship.
4. In-service training: referred to teachers and nurses only. The examples given to interviewers were training programmes attended by teachers during the school holidays, midwifery training, and clientele management training for nurses.
5. MARA training programmes (Government)

6. KEMAS training programmes (Government)

7. Other government programmes

8. Co-operative or trade unions

9. Armed forces (excludes police training which was included in code 7)

10. Others - other than above classification.

Again, for the purpose of enlarging cell numbers, codes 1-4 are grouped under private training (TRAINP), code 5-7 as Government training (TRAING) and codes 8, 9 and 10 as others (OTHTRAIN).

ii) Status of the respondent in the training programme

Full time training referred to them having a regular morning and/or afternoon session while the part time response was broken into two, an option between 5-20 hours/week or less than 5 hours/week. Sixty-three percent of the respondents were full time participants in their first longest training programme. The two part-time status options were combined to form the part-time status variable. For more detailed analysis, these two variables will be combined with the information on the types of training to derive 6 variables, full-time government training programme (FTGTR), part-time government training programme (PTGTR), full-time private training programmes (FTPTR), part-time private training programme (PTPTR), full-time other training programme (OTFTTR) and part-time other training programme (OTPTR).

iii) How long ago was the training?

To obtain this variable, the answer given to *"When did you begin that programme?"* is subtracted from the year of the survey, i.e.1988. Three variables were derived and they are ZERONINE for those who had recently participated in the training programme, i.e. between 0-9 years from the year of the survey and TENMORE indicating those having participated in the training 10-19 years ago. The last category, TWENMORE refers to those who had participated in the training programme 20 or more years ago.

5.4.2 Other Variables

The variables used for the analysis of the determinants of training, taken from the MFLS1 are:-

Marital Status (MARST)

Similar to that derived from the MFLS2 data, we use a dummy variable to indicate the marital status of the woman in 1976, a 1 if the individual is married and a 0 dummy if otherwise. As summarised in section 5.4, the individual is considered as unmarried if she is single, separated, divorced or if she is a widower.

Highest Education Level Achieved (EDUCERT)

This variable shows the highest education level achieved by each woman in the sample. The higher the number, the higher the level of education achieved. This means that the variable is ranked from 0 to 5 where 0 indicates that she had not completed any level of schooling and a 5 indicates that she would have had completed a higher education level.

Savings in a bank (BANK)

A dummy variable of 1 and 0 indicating if the woman had money in the Bank or in a savings account in 1976.

Mother's working status (MOTHER)

This is a dummy variable, which refers to whether the woman's mother was working or not in 1976. A 1 if the mother is working and 0 otherwise.

Father's occupation

This variable is divided into four dummy variable categories.

F_AGRI is a 1 if the woman's father works in the agriculture sector.

F_BLUE is a 1 if the woman's father is a blue collar worker and

F_WHITE is a 1 if the woman's father is a white collar worker while

F_OTHER is a 1 if the woman's father works in some other occupation type, which could not be classified under agriculture, blue-collar or white-collar work.

Race Variable

The race variable is as described above in section 5.4.

Table 5.1A-C in the next page details the summary statistics of all the variables used.

Table 5.1A: Panel and Children Sample - Descriptive Summary

Variable	Number of Observation	Mean	Standard Deviation	Minimum	Maximum
Total INCOME (in Malaysian Ringgit)	686	84.423	134.964	0.729	2032.990
LNINC	686	3.911	1.046	-0.316	7.617
AGE	926	37.105	12.893	16	75
AGE^2	926	1518.046	922.756	256	5625
PRIM	718	0.636	0.481	0	1
LOWSEC	718	0.081	0.273	0	1
UPPSEC	718	0.191	0.393	0	1
PREUNI	718	0.071	0.257	0	1
HIGHED	718	0.021	0.143	0	1
LNHOURS	896	3.593	0.612	0.693	5.124
MARRY	926	0.735	0.441	0	1
TRAIN	925	0.234	0.423	0	1
NTRAIN	925	0.464	1.655	0	30
EMPLOYEE	926	0.508	0.500	0	1
EMPLOYER	925	0.257	0.437	0	1
UNPAID	925	0.235	0.424	0	1
TRAINP	925	0.120	0.325	0	1
TRAING	925	0.042	0.201	0	1
OTHTR	925	0.071	0.258	0	1
FTGTR	926	0.367	0.188	0	1
PTGTR	926	0.054	0.073	0	1
FTPTR	926	0.079	0.270	0	1
PTPTR	926	0.041	0.198	0	1
OTFTTR	926	0.031	0.174	0	1
OTPTR	926	0.040	0.196	0	1
ZERONINE	926	0.119	0.324	0	1
TENMORE	926	0.030	0.171	0	1
TWENMORE	926	0.017	0.130	0	1
THIRTY	926	0.05	0.073	0	1
MALAY	926	0.605	0.489	0	1
CHINESE	926	0.255	0.436	0	1
INDOTH	926	0.140	0.348	0	1

Table 5.1B: New Sample - Descriptive Summary

Variable	Number of Observation	Mean	Standard Deviation	Minimum	Maximum
Total INCOME (in Malaysian Ringgit)	963	114.768	422.595	2.309	12487.500
LNINC	963	4.232	0.905	0.837	9.432
AGE	1177	32.221	7.794	17	46
AGE^2	1177	1098.880	517.236	289	2401
PRIM	976	0.530	0.499	0	1
LOWSEC	976	0.106	0.307	0	1
UPPSEC	976	0.264	0.441	0	1
PREUNI	976	0.079	0.270	0	1
HIGHED	976	0.022	0.145	0	1
LNHOURS	1153	3.633	0.600	0	5.124
MARRY	1177	0.754	0.431	0	1
TRAIN	1177	0.317	0.465	0	1
NTRAIN	1177	0.627	1.663	0	20
EMPLOYEE	1177	0.626	0.484	0	1
EMPLOYER	1177	0.012	0.108	0	1
UNPAID	1177	0.167	0.373	0	1
TRAINP	1177	0.153	0.360	0	1
TRAING	1177	0.064	0.244	0	1
OTHTR	1177	0.100	0.300	0	1
FTGTR	1177	0.057	0.232	0	1
PTGTR	1177	0.007	0.082	0	1
FTPTR	1177	0.110	0.314	0	1
PTPTR	1177	0.042	0.202	0	1
OTFTTR	1177	0.045	0.207	0	1
OTPTR	1177	0.055	0.228	0	1
ZERONINE	1177	0.141	0.348	0	1
TENMORE	1177	0.068	0.252	0	1
TWENMORE	1177	0.014	0.119	0	1
MALAY	1177	0.472	0.499	0	1
CHINESE	1177	0.294	0.456	0	1
INDOTH	1177	0.234	0.423	0	1

Table 5.1C: MFLS1 data - Descriptive Summary

Variable	Number of Observation	Mean	Standard Deviation	Minimum	Maximum
MARST	843	0.947	0.225	0	1
EDUCERT	525	0.194	0.636	0	5
BANK	843	0.272	0.445	0	1
MOTHER	843	0.643	0.479	0	1
F_WHITE	843	0.396	0.489	0	1
F_AGRI	843	0.311	0.463	0	1
F_BLUE	843	0.178	0.383	0	1
F_OTHER	843	0.115	0.319	0	1
MALAY	843	0.546	0.498	0	1
CHINESE	843	0.327	0.469	0	1
INDOTH	843	0.126	0.332	0	1

5.5 THE RESULTS

Results of the regression analysis will be organised according to the different samples, i.e. the Panel and Children Sample, followed by the results from the New Sample.

5.5.1 Panel and Children Sample.

Table 5.2 details the Human Capital Earnings Function regression results for the Panel and Children Sample.

Column (1) in Table 5.2 shows the results of the regression containing only the age variable and the education variable. Column (2) includes the marital status variable column (3) has the log of hours worked variable included. The returns to training can be seen from the results in column (4). Employment status of the woman is then included into the regression and the result of this analysis is in column (5). Column (6) details the results of the regression, which includes the race variables.

The signs of the coefficients were as expected. In column (1), positive returns were obtained for all educational levels. The highest average returns were for those with higher education qualification. In this sample, there were only 2 percent of the women who had completed higher education and the average educational attainment for the women was lower secondary schooling. This could explain why the high returns to higher education was found. Returns to higher education, i.e. university degree was also found to be high in the study by Mazumdar (1981) using the Migration and Emigration Survey of 1975. The coefficient of a university degree was found to be as high as 202 percent for principle male earnings working in the public sector and a coefficient of 180 percent was found for those working in the private sector.

The marital status dummy coefficient is negative and is not significant. However, the sign on the coefficient of this marital status variable flips and becomes positive when we move along the remaining columns. Nevertheless, it remains insignificant.

When the marital status is included, the average returns to each level of education remain with negligible changes. The additional variable in Column (3), the LNHOUR variable displays a change of 0.75 percent in earnings for every percent change in the number of hours worked.

The training dummy coefficient[119] (in Column (4)) is positive and highly significant and indicates a 41 percent increase in earnings if the woman had participated in a job-related training programme. By being employers and unpaid workers (refer to results in Column (5)), the women in this sample are losing out on their income as it reduces income compared to the control group by 49 percent and 93 percent respectively. The employees category is the control group in this latter analysis.

When the race variable is included into the model (Column (6)), the training dummy coefficient remains positive and highly significant. By controlling for race, the magnitude of the education variables increases by 5 percentage points for those with lower secondary qualifications to an increase in returns of 11 percentage points for those with higher educational qualifications, i.e. at the pre-university and higher education levels.

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[119] The calculation of the percentage effect of a dummy variable in a semilogarithmic equation is given by: $100 \times [\exp(\beta) - 1]$ (Halvoren and Palmquist, 1980).

The race variables show that the Chinese and Indians/Others have a significant and positive impact on earnings. The results indicate that a Chinese woman will get a 33 percent higher earnings than the reference category, the Malays (holding other factors constant) while an Indian/Others will get 19 percent higher earnings than a Malay person.

The marginal rate of return[120] to successive levels of education, PRIM to LOWSEC, LOWSEC to UPPSEC, UPPSEC to PREUNI and PREUNI to HIGHED are 11 percent, 18 percent, 24 percent and 17 percent respectively using the results in column (6). Comparing these marginal rates with those obtained by Mazumdar (1981), we find similar patterns in the results especially within the higher educational categories of PREUNI and HIGHED. Mazumdar's[121] marginal returns to the HIGHED level were 11 percent for both the private and public sector. At the PREUNI level, we estimated it to be at 23 percent for the public sector employees and 15 percent for the private sector employees.

[120] The marginal rates of returns(r) are calculated via the following formulae. The marginal rates of returns estimated here depicts the annual marginal rate of returns accrued for the succession to the next level of education.

$r_{(LOWSEC\ vs.\ PRIM)} = [(\text{antilog}\ (\beta_1/S_{LOWSEC} - S_{PRIM})) - 1] * 100,$

$r_{(UPPSEC\ vs.\ LOWSEC)} = [\ (\text{antilog}\ (\beta_2 - \beta_1)/(S_{UPPSEC} - S_{LOWSEC})) - 1]\ *\ 100$

$r_{(PREUNI\ vs.\ UPPSEC)} = [\ (\text{antilog}\ (\beta_3 - \beta_2)/(S_{PREUNI} - S_{UPPSEC})) - 1]\ *\ 100$

$r_{(HIGHED\ vs.\ PREUNI)} = [\ (\text{antilog}\ (\beta_4 - \beta_3)/(S_{HIGHED} - S_{PREUNI})) - 1]\ *\ 100$

where S stands for the number of years of schooling of the subscripted educational level (S_{PRIM}=6, S_{LOWSEC}=9, S_{UPPSEC}=11, S_{PREUNI}=13 and S_{HIGHED}=17)

[121] We recalculated the marginal returns in Mazumdar's study as the marginal returns in Mazumdar's study were not divided by the number of years of schooling of the subscripted educational level.

The analysis is further extended into looking at the first longest training the woman has ever attended. By using the data collected on the first longest training the woman has attended, the impact of the various categories of training can be estimated. For this purpose, Table 5.3, will detail the results of this analysis.

In column (1), in addition to the age, education, log of hours worked per week, marital status and the race variables, the type of training that the woman had participated in as her first longest training programme is included. As described in section 5.4, the dummy variable TRAINP refers to those having done their first longest training with the private sector, TRAING, those having done their first longest training with the Government sector and OTHTRAIN refers to the other types of training programmes not classified in the 10 categories of training programmes listed in section 5.4.1.

In column (2), we have combined the training status of the women with the type of training programme in which she was a participant. Column (3) lists the results on how long ago the first longest training was completed. Three periods are used, from the recently trained, a) most recent, i.e. year of survey to 9 years ago, b) 10 to 19 years ago and c) 20 to 29 years ago.[122]

[122] The reference category is those who did not have any training.

The results show that both private and government type training brought positive returns to the women. The difference between the returns to private type and government type training is very small and insignificant (3 percentage points difference).

When the women's status in the training programme is considered within the individual type of training programme, the full-time participants appear to benefit more than those do in part-time training. The coefficient on the part-time government and private training programme variable are positive but insignificant.

When considering how long ago the first longest training was done, the results were rather intriguing as those who were trained 20 or more years ago appeared to have a higher coefficient than those trained very recently.[123]

The results show that those who had done their first longest training 20 or more years ago had an impact of a 119 percent increase in earnings compared to an impact of 22 percent increase for those who were very recently trained, i.e. during the year of the survey to 9 years ago. An explanation for this occurring could be due to the scarcity of trained women 20 to 30 years ago (i.e. in the 1950s – 1960s). Hence, when a woman was trained, she was considered to have the skills to carry out her work and was then paid well

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[123] These results should be interpreted with caution as these results are based on small sample sizes. We have drawn this inference from 18 percent (of the total 533 sample) who had experienced training recently (ZERONINE), 5 percent who had undergone training ten or more years ago (TENMORE) and 3 percent who had undergone training twenty or more years ago (TWENMORE).

according to her skills. This variable could also be picking up the experience that one has when having had the training done long ago.

Table 5.2: Panel and Children Sample: Human Capital Earnings Function

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	2.075*** (0.419)	1.995*** (0.460)	-0.670 (0.489)	-0.602 (0.048)	-0.138 (0.459)	-0.112 (0.454)
AGE	0.090*** (0.024)	0.096*** (0.028)	0.085*** (0.025)	0.080*** (0.024)	0.083*** (0.023)	0.078*** (0.023)
AGE^2	-0.001*** (0.0003)	-0.001*** (0.0003)	-0.001*** (0.0003)	-0.001*** (0.0003)	-0.001*** (0.0003)	-0.001*** (0.0003)
LOWSEC	0.387** (0.189)	0.389** (0.188)	0.429*** (0.166)	0.328* (0.169)	0.270* (0.156)	0.317** (0.158)
UPPSEC	0.760*** (0.112)	0.759*** (0.112)	0.758*** (0.101)	0.640*** (0.100)	0.565*** (0.094)	0.641*** (0.100)
PREUNI	1.308*** (0.140)	1.310*** (0.141)	1.321*** (0.134)	1.145*** (0.135)	0.970*** (0.134)	1.072*** (0.136)
HIGHED	2.009*** (0.145)	2.010*** (0.148)	2.018*** (0.164)	1.792*** (0.191)	1.591*** (0.181)	1.696*** (0.178)
MARRY		-0.043 (0.096)	0.033 (0.084)	0.008 (0.085)	0.042 (0.079)	0.055 (0.078)
LNHOURS			0.748*** (0.076)	0.740*** (0.074)	0.627*** (0.077)	0.602*** (0.078)
TRAIN				0.341*** (0.088)	0.358*** (0.083)	0.311*** (0.082)
EMPLOYER					-0.494*** (0.101)	-0.425*** (0.105)
UNPAID					-0.928 (0.693)	-0.983* (0.553)
CHINESE						0.326*** (0.078)
INDOTH						0.190* (0.103)
R^2	0.26	0.26	0.41	0.43	0.46	0.48
Sample Size	533	533	533	533	533	533

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 10 percent significance level
** is significant at the 5 percent significance level
*** is significant at the 1 percent significance level

Table 5.3: Panel and Children Sample: First Longest Training

Variables	(1)	(2)	(3)
Constant	-0.427 (0.472)	-0.381 (0.463)	-0.216 (0.467)
AGE	0.073*** (0.023)	0.071*** (0.023)	0.064*** (0.024)
AGE^2	-0.001*** (0.0003)	-0.001*** (0.0003)	-0.001*** (0.0003)
LOWSEC	0.372** (0.167)	0.363** (0.173)	0.350** (0.167)
UPPSEC	0.681*** (0.101)	0.667*** (0.103)	0.655*** (0.100)
PREUNI	1.156*** (0.134)	1.068*** (0.136)	1.182*** (0.135)
HIGHED	1.841*** (0.171)	1.771*** (0.185)	1.870*** (0.180)
LNHOURS	0.681*** (0.076)	0.680*** (0.075)	0.685*** (0.075)
MARRY	0.039 (0.083)	0.037 (0.083)	0.029 (0.082)
CHINESE	0.423*** (0.079)	0.431*** (0.080)	0.407*** (0.077)
INDOTH	0.310*** (0.101)	0.337*** (0.102)	0.304*** (0.099)
Private type training (TRAINP)	0.407*** (0.100)		
Government type training (TRAING)	0.373** (0.149)		
Other types of training (OTHTRAIN)	-0.024 (0.129)		
Full-time government training programme		0.436*** (0.160)	
Part-time government training programme		0.115 (0.238)	
Full-time private training programme		0.561*** (0.121)	
Part-time private training programme		0.186 (0.139)	
Full-time in other training programmes		-0.016 (0.243)	
Part-time in other training programmes		-0.032 (0.141)	
0-9 years ago			0.199** (0.093)
10-19 years ago			0.439*** (0.168)
20 and more years ago			0.783*** (0.253)
R^2	0.46	0.47	0.46
Sample Size	533	533	533

Figures in parenthesis are White heteroskedasticity-corrected standard errors. * is significant at the 10 percent significance level** is significant at the 5 percent significance level, *** is significant at the 1 percent significance level

5.5.2 New Sample

The new sample consists of women aged 18 to 49 and may be married or not married. The regressions are applied to the data collected from this sample and Table 5.4 shows the results of these regressions.

The column layout of Table 5.4 detailing results for the New Sample is similar to the ones described for Table 5.2.

The average returns to the different levels of education for the women in the new sample are positive and significant. Similar to the results found in the Panel and Children sample, the new sample women with higher education qualification receive the highest average returns. Moreover, the magnitudes are not very different. An interesting finding in the new sample is that when the new sample woman is married, her income increases by about 15 to 21 percent. This variable is significant in this sample, unlike its lack of importance in the Panel and Children sample.

Participation in a job-related training programme also shows a positive impact on income for the women in the new sample. Income increases by 26 percent for those who had ever participated in a job-related training programme as can be seen in column (4). The results in column (5) show that unpaid family workers get 46 percent of lower income than those who are employees while women employers in this sample gets a 49 percent of lower income than the employees in this sample. When the race variable is included into the regression, the results in column (6) indicate increases in the magnitude of the education coefficient and both the Chinese and Indian/Others race variables are positive and significant. The training variable remains positive and significant when the race variables are included, indicating a 19 percent increase in wages for those having participated in a training programme.

The marginal rate of returns for the new sample are 8 percent for LOWSEC vs. PRIM, 20 percent for UPPSEC vs. LOWSEC, 23 percent for PREUNI vs. UPPSEC and 13 percent for HIGHED vs. PREUNI using the results in column (6).

Table 5.5 shows the results of the analysis for the first longest training the respondent had participated in. The column descriptions are as per the Panel and Children sample. Those who had participated in a private type training programme for their first longest training had an increase in their income by 39 percent compared to a 12 percent increase in income for those who had participated in a government type training. When the training type is broken down to include the training status, those who participated in a part-time government-training course had a reduction in their income by 32 percent and this variable is significant. Private training had a positive impact on income, regardless of whether it was on a full-time or part-time basis. However, the private part-time training variable was insignificant.

The findings on the impact of how long ago the training was taken and income was similar to the Panel and Children sample finding. The longer ago the training was given the higher the income. Again, this variable could be picking up the experience and cohort effect of such training.

In terms of the sponsors for the training, the majority of the trainees said that the government had paid for their training expenses. Thirty-seven percent of the 373 respondents indicated the government as the first source of payment for their first longest training. This was followed by 25 percent of them being sponsored by their parents. Seventeen percent of them paid for their own training or had their spouse pay for them.

From the results, we find that those who had received government type training as their first longest training did not receive high returns compared to private type training, i.e. returns from the Government type training were only 10 percent. The difference between the returns to the private type training and government type training was significant at the 5 percent significance level. This could indicate that the government training that was provided was either ineffective or not relevant to the work that the respondent was doing. Alternatively, the returns could be downward biased if below-average ability workers are selected or choose to take government type training programmes. Further research into this area may provide more answers to this issue.

Table 5.4: New Sample: Human Capital Earnings Function

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.574*** (0.451)	1.907*** (0.492)	-0.630 (0.467)	-0.445 (0.468)	-0.217 (0.446)	-0.443 (0.442)
AGE	0.137*** (0.030)	0.112*** (0.033)	0.107*** (0.027)	0.094*** (0.027)	0.114*** (0.026)	0.125*** (0.025)
AGE^2	-0.002*** (0.001)	-0.002*** (0.001)	-0.001*** (0.0004)	-0.001*** (0.0004)	-0.001*** (0.0003)	-0.002*** (0.0003)
LOWSEC	0.246** (0.096)	0.259*** (0.097)	0.266*** (0.093)	0.213** (0.095)	0.183** (0.092)	0.231*** (0.090)
UPPSEC	0.737*** (0.064)	0.737*** (0.063)	0.733*** (0.056)	0.636*** (0.060)	0.530*** (0.056)	0.599*** (0.056)
PREUNI	1.191*** (0.078)	1.194*** (0.079)	1.195*** (0.075)	1.053*** (0.085)	0.925*** (0.083)	1.005*** (0.082)
HIGHED	1.772*** (0.127)	1.784*** (0.120)	1.725*** (0.123)	1.604*** (0.125)	1.465*** (0.120)	1.511*** (0.132)
MARRY		0.138* (0.071)	0.180*** (0.061)	0.163*** (0.060)	0.184*** (0.059)	0.212*** (0.058)
LNHOURS			0.683*** (0.064)	0.687*** (0.065)	0.563*** (0.066)	0.535*** (0.065)
TRAIN				0.228*** (0.057)	0.233*** (0.054)	0.178*** (0.053)
EMPLOYER					-0.493*** (0.074)	-0.492*** (0.073)
UNPAID					-0.462*** (0.112)	-0.345*** (0.114)
CHINESE						0.324*** (0.056)
INDOTH						0.172*** (0.050)
R^2	0.30	0.30	0.46	0.47	0.51	0.53
Sample Size	804	804	804	804	804	804

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 10 percent significance level
** is significant at the 5 percent significance level
*** is significant at the 1 percent significance level

Table 5.5: New Sample: First Longest Training

Variables	(1)	(2)	(3)
Constant	-0.750 (0.458)	-0.752 (0.459)	-0.779* (0.461)
AGE	0.108*** (0.026)	0.111*** (0.026)	0.112*** (0.026)
AGE^2	-0.001*** (0.0003)	-0.002*** (0.0003)	-0.002*** (0.000)
LOWSEC	0.265*** (0.092)	0.270*** (0.092)	0.234** (0.092)
UPPSEC	0.670*** (0.062)	0.657*** (0.062)	0.644*** (0.063)
PREUNI	1.069*** (0.089)	1.019*** (0.090)	1.050*** (0.091)
HIGHED	1.619*** (0.138)	1.563*** (0.141)	1.578*** (0.144)
LNHOURS	0.664*** (0.065)	0.653*** (0.065)	0.663*** (0.065)
MARRY	0.204*** (0.060)	0.195*** (0.060)	0.182*** (0.059)
CHINESE	0.309*** (0.060)	0.331*** (0.062)	0.342*** (0.056)
INDOTH	0.223*** (0.053)	0.238*** (0.053)	0.236*** (0.052)
Private type training (TRAINP)	0.328*** (0.064)		
Government type training (TRAING)	0.109 (0.094)		
Other types of training (OTHTRAIN)	0.022 (0.089)		
Full-time government training programme		0.179* (0.102)	
Part-time government training programme		-0.276** (0.137)	
Full-time private training programme		0.418*** (0.065)	
Part-time private training programme		0.140 (0.109)	
Full-time in other training programmes		0.035 (0.130)	
Part-time in other training programmes		0.007 (0.105)	
0-9 years ago			0.245*** (0.064)
10-19 years ago			0.320*** (0.097)
20-29 years ago			0.632*** (0.169)
R^2	0.50	0.51	0.51
Sample Size	804	804	804

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 10 percent significance level
** is significant at the 5 percent significance level and *** is significant at the 1 percent significance level

The results so far suggest that both training and education have a positive impact on income among the Malaysian women interviewed in the Malaysian Family Life survey.

In chapter 3, one of the issues discussed pertaining to the rate of returns to education estimates is that of omitted variables where it has been argued among economists that due to the endogeneity of the education variable, the estimates of the rate of returns will be overestimated. However, in recent research findings, there appears to be some consensus that the omitted variable bias is small. In addition, there are research findings, which shows that the large differences between the results obtained after controlling for omitted variable bias and the ones obtained via the OLS regressions are insignificant. In Dearden (1999), the measurement error found in the schooling variable, which causes a downward bias on the returns to schooling offsets the upward bias caused by the omitted variable problem.

One could also argue that access to training could be selective and if so, the estimate of the effects of training is biased. We will examine this possibility in section 5.7 when we look into the emerging issues that could be raised from our training results.

5.6 THE DETERMINANTS OF TRAINING

The advantage of using the MFLS data sets is the availability of a panel of women interviewed in 1976 and re-interviewed in 1988. A total of 889 women were re-interviewed in the 1988 survey, which gives this survey a relatively good response rate of 70 percent. By having this group of re-interviewed women, we are able to extend our training investigation particularly for this group of women.

We are going to extend our investigation by looking at the *determinants of training. To* allow this investigation to be carried out, we would need to find a set of variables identified as the determinants of training. We find that we have a valuable determinant to training in the panel sample data set. This variable is the savings in the bank variable (BANK). There are not many studies which have the advantage of examining such a variable as we have noted in Chapter 4. We hypothesise that if the woman had money in a bank account in 1976, she is more likely to participate in job-related training.[124]

Other than the BANK variable, we will investigate if participation in training was influenced by the women's marital status and level of education achieved 12 years ago in 1976. Other variables analysed which are thought to influence training are the women's

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[124] Blundell, et al. (1995) notes "Increased wealth is likely to make access to training easier than for individuals who are liquidity constrained since some forms of training will have to be financed by the individual themselves (either through cost earnings and/or directly through fees)".

parent's occupation where a dummy variable will be used to represent the mother's working status, i.e. a 1 if the mother is working and 0 if otherwise. The father's occupation status as described in section 5.4.2, i.e. divided into the 4 work categories, agriculture, white collared, blue collared and others. The while collar work category (F_WHITE) is the reference category.

Although there were 889 women from the first MFLS that were re-interviewed, we had to drop 6 women from the merged data sets. These 6 women were dropped due to a misunderstanding among the women in the household. RAND and LPPKN noted that there were 6 original MFLS1 women who were not interviewed in MFLS2 because her mother or another women in the household had claimed to be the MFLS1 woman. This led to the MFLS1 data not being found for the 6 women claiming to be the panel woman when in fact, they were not the original MFLS1 women.

In addition to these 6 women, 4 other respondents were dropped due to discrepancies in their gender and race data. A total of 36 women had missing responses to the BANK variable question. The final sample size we had was 843 women but only a total of 525 respondents had full information, which we then used in our probit regression.

Table 5.6 details the results of the probit regressions used to analyse the determinants of training. Column (1) refers to the probit regression looking into the women's marital status in 1976, her highest education level achieved in 1976 and the BANK variable. Column (2) and (3) includes the analysis on the mother's working status and father's occupation respectively. Column (4) includes the analysis of the race variables.

From the results, marital status did not appear to be a significant factor in the probability of a woman being trained. The higher the education level, the higher the probability that the woman will receive training and the result for this variable is highly significant. Having savings in a bank also increases the probability that the woman will participate in some sort of job related training (as indicated in Column (1)). This indicates that money saved could be invested in education and training. This finding provides evidence that credit constraints may be a determining factor in training participation.

The Chinese appear to have a higher probability of participating in training compared to the Malays and this variable is significant. The BANK variable remains positive although it is insignificant when the race variables are included.[125]

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[125] We explored the BANK variable further by analysing our sample according to the races. We ran the regressions according to the Chinese (178 respondents) and the Malays combined with the Indians (324 number of respondents). The BANK variable was positive but insignificant throughout all the regressions in the Chinese sample (with the exception of the regression as per Column (1) of Table 5.6 where the BANK variable was positive and significant). In the combined Malay and Indian sample, the BANK variable is positive and significant at the 5 percent level. This seems to indicate that the BANK variable has a stronger influence on the latter group's likelihood of training compared to the former group of women.

The results in column (3) and (4) show that all the variables included in the regression are significant with the exception of the marital status variable, the mother's working status and in cases where the women's father is a blue collared worker or if he is in the unclassified occupation category. The results also show that the propensity of a woman being trained would be lower if her father was in the agriculture sector. This lower probability of training can be explained by looking at the culture of the agriculture sector in Malaysia, both historically and in the present times. The agriculture sector is a sector whereby the work is passed down from father to son or an occupation that is inherited.

Due to this, the possible explanation to the negative propensity of training is that the chances of a woman being trained to take over her father's agricultural land or work would be lower compared to the propensity of her brother or husband being trained.

Our results show that a woman can be induced to participate in training when and if there are monetary resources available. Those without the monetary resources would find it difficult to participate in training, reiterating the problem of being credit constrained.

Table 5.6:Panel Sample: Probabilities of being trained

Variables	(1)	(2)	(3)	(4)
Constant	-1.716*** (0.405)	-1.574*** (0.413)	-1.458*** (0.426)	-1.959*** (0.412)
MARST	0.460 (0.407)	0.513 (0.415)	0.512 (0.431)	0.411 (0.412)
EDUCERT	0.698*** (0.125)	0.656*** (0.123)	0.658*** (0.131)	0.784*** (0.148)
BANK	0.442*** (0.141)	0.436*** (0.143)	0.378** (0.148)	0.223 (0.162)
MOTHER		-0.338** (0.140)	-0.091 (0.152)	-0.050 (0.160)
F_AGRI			-0.980*** (0.236)	-0.709*** (0.249)
F_BLUE			-0.126 (0.182)	-0.205 (0.194)
F_OTHER			-0.306 (0.230)	-0.292 (0.245)
CHINESE				1.112*** (0.174)
INDIAN/ OTHERS				0.356 (0.257)
Sample Size	525	525	525	525

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 1 percent significance level
** is significant at the 5 percent significance level
*** is significant at the 10 percent significance level

5.7 EMERGING ISSUES

In this section, we return to our estimated impact that training has on the individual women in our sample. Three issues could be raised pertaining to the coefficient on the training variable that we have used. They are (a) endogeneity, whereby one could argue that the training variable is endogenous. The more able women are those who will train, therefore our variable captures those that have higher ability. If endogeneity is present, this makes our training variable correlated with the error term in the regression.

The second issue, (b) our training coefficient is plagued by sample selection bias. The women in our sample could have self-selected themselves into training. Those who have the resources to participate in training are more likely to take part in training (as supported by our findings using the BANK variable). Alternatively, one could argue that employers would only select those who have higher capabilities to participate in training.[126]

The third issue that can be raised is a combination of issues (a) and (b), where both endogeneity and sample selection is said to have occurred. In fact, one can argue that our model is confronted with a double selection issue. In this case, the second sample selection arises from the fact that we have used a woman only sample, which raises the issue of sidelining the women in our sample who chose not to work. Consequently, we only have wages of those who work and have used a censored sample.

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[126] Given that we have used a dummy variable to measure training participation, the two issues of (a) endogeneity and (b) sample selection that we raise cannot be clearly distinguished. One could claim that our sample selection issue is an endogeneity problem and vice versa, our endogeneity problem could be a sample selection issue as well.

Econometrically and theoretically, the endogeneity issue stems from believing that the training status of our women has an intercept effect on wages while the sample selection issue generates the believe that the training variable also has a slope effect (whereby all the coefficient in our regression differs according to the woman's training status).[127]

Another way of distinguishing between the two main issues of endogeneity and sample selection is that sample selection refers to problems where wages is only observed for a restricted, non-random sample (e.g. we are only observing wages for women who opt to participate in the labour force). Endogeneity on the other hand, refers to complications tied in with the wage of a "problematic" independent variable in the regression.

As noted in Chapter 3 of this thesis, the endogeneity problem is usually solved via the IV method while the sample selection bias can be corrected via the Heckman procedure. Although it would be ideal to be able to address these issues, our data set does not seem to allow us to do so. We believe that the BANK variable is a credible instrumental variable to use as proxy for our training variable. In addition, the determinants of training analysis that we have conducted could play a dual role. It could firstly, allow us to determine the factors influencing training participation decision and secondly, we could use our probit estimates obtained to correct for self-selection bias in training participation

[127] The effects on the intercept and/or the slope as we have raised here are subject to a researcher's perception of the effects of training on an individual.

among the women in the Panel sample. Unfortunately, we were restricted with a small sample size to work with when using the available methods[128] for analysis.

We find that our sample size decreases to 385 women when we merge our probit sample (i.e. the 525 women) with our 1988-income data file. Out of these 385 women, we only have 107 women with complete information[129] to run the appropriate equations to consider the emerging issues.[130]

Out of these 107 women, only 27 of them have training experience. This sample size is too small for analysis and it would be difficult to draw conclusions from the results obtained.

5.8 CONCLUSION

One of the two objectives of this chapter was to estimate the average returns to education and training by using the two sets of Malaysian Family Life Survey data, collected in 1976 and 1988. Utilising an augmented Mincerian Earnings Function, this study has shown that the returns to education are high and positive for the women who had

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[128] This refers to the 2SLS or instrumental variable method to correct for endogeneity.
[129] Complete information here refers to all variables used in both the earnings function and probit model.
[130] When we limited our usage of variables to just the BANK variable taken from the MFLS1 (i.e. leaving out the father and mother's working status, marital status of the respondent in 1976 and so on) our sample size did not improve to our advantage. We had information of 186 women to analyse and the results that we obtain did not appear to allow us to draw practical economic conclusions from it.

participated in the MFLS2 survey. The average returns to the different levels of education found in this study is very high for those with higher education qualifications. The magnitude obtained are almost comparable to those obtained by Mazumdar using a 1975 data set on principle male earners in the urban areas of Peninsular Malaysia.

Within the two higher educational categories (i.e. PREUNI and HIGHED), the PREUNI level had the higher marginal returns accrued for each additional year taken to achieve the next level of education. Similar results were obtained by Mazumdar (1981) when she had used the 1975 data set containing information on the principal male earners in Peninsular Malaysia.[131]

A noteworthy finding in this chapter is the positive and significant impact of training on earnings for the women in both the Panel and Children sample and the New Sample. The results indicate returns of 36 percent for the Panel and Children sample and 19 percent for the New Sample. This finding ties in with the fact that there was a high demand for trained personnel in Malaysia during its high growth period in the 1980s. However, having noted the magnitude that we have obtained from our regression, we need to be aware of the issues that can be linked to our estimates. Our results could be affected by the endogeneity of the training variable and/or sample selection issues (as we have

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[131] We discussed this comparison when we looked at the results in section 5.5.1.

discussed in section 5.7) and if so, our estimates could be biased. Nevertheless, we can confidently note that training appears to be associated with higher earnings from our results. The other finding on training that we have indicate that full-time government and private training are more beneficial than the part-time government and private training.

In addition to obtaining the first rough estimates of the gross returns to training, we are also able to identify the determinants of training by using information provided by the Panel Sample in the first MFLS. So far, the sole study[132] that is available pertaining to the determinants of training in Malaysia has not examined the determinants of training from the viewpoint of an individual. The results of this study was mainly based and derived from firm-level data, which would not contain personal information such as this BANK variable, which is available on the MFLS data set.

A prominent finding from this attempt is that our BANK variable is a positive and significant determinant in the probit regressions. This indicates that some individuals who are credit constrained may be unable to participate in training although there are positive returns to training. While the study by the World Bank (1997) for Malaysia shows that one of the reasons that firms do not train is due to lack of funds,[133] this study

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[132] Tan and Batra (1995) or at the country level reporting, see World Bank, 1997.

[133] In the MITP survey which Tan and Batra (1995) had used in their multi country study on training, the manufacturing firms in Malaysia were asked to rank on a scale of one to five the relevance of a set of seven statements pertaining to their decision to provide little or no training. Out of this exercise, limited resources was ranked fourth in importance in Malaysia (World Bank, 1997).

contain findings that indicate that the same situation could occur at the individual level as well.

We are also able to identify that the Chinese and those with higher education levels tend to have higher probabilities of participating in training. The latter finding confirms that education and training are indeed complements (see for example, Bartel (1995), Lillard and Tan (1992) and Hill (2001)). The finding that the Chinese have higher probabilities to participate in training calls for further research to look into the issues and policy implication of this result.

In conclusion, we are able to derive the first estimates of the returns to training using two data sets collected in the 1970s and 1980s and the findings reveal positive and significant returns to the individual. Although the estimates of the gross returns to training is not perfect, it is the closest and best estimates that we have at the present moment. We have also closed the information gap found in the Malaysian education and training literature by deriving the first set of individual determinants to training. The policy implication of these findings will be discussed in chapter 8.

CHAPTER 6

THE MALAYSIAN HOUSEHOLD INCOME SURVEY: THE RATE OF RETURNS TO EDUCATION 1997

6.1 INTRODUCTION

In the previous chapter, we have estimated the returns to education and training, with the latter being the more important finding[134] for a group of randomly selected women from 2 data sets collected in the 1970s and 1980s. In the literature review presented earlier in this thesis, we have also found that the estimates of the returns to education in Malaysia are rather outdated and that these returns have only been calculated for a selected group of people which does not represent the entire Malaysian population.

In this chapter, we attempt to rectify this condition by using a data set, the Malaysian Household Income Survey (HIS), which was made available to us by the Malaysian Government's Economic Planning Unit (EPU). The latest data set made available to us is the 1997 HIS. By using this latest data set, we will be able to present reasonably up-to-date rate of return to education estimates for Malaysia. For further analysis, the results could also be compared with earlier returns to education studies conducted for Malaysia. If there were higher returns to higher levels of education in our findings, we would be able to confirm the findings found in the majority of the previous Malaysian rate of returns to

[134] The training variable in the MFLSs allowed the first training estimates for a sample of randomly selected females to be calculated, hence making this a more important finding.

education studies. Based on the overview of the returns to education studies by Psacharopoulos (1994), we would expect to find the female returns to education to be higher than those obtained for the males.

The methodology adopted in this chapter is equation (5.2) in Chapter 5, minus the augmented training variable, T. The equation is

$$\ln Y_i = \alpha + \beta Q + \gamma_1 AGE_i + \gamma_2 AGE_i^{\,2} + \varepsilon_i \tag{6.1}$$

where Q is a vector of dummy variables of the individual's schooling level and other variables deemed to have an influence on earnings.

This chapter will be divided into the following sections. The next section will discuss the data set used, followed by a description of the variables in the model and data set. Section 3 will detail the estimation results while section 4 will provide the conclusion to this chapter.

6.2 THE MALAYSIAN HOUSEHOLD INCOME SURVEY

The Malaysian Government has been collecting data on Malaysian households since the 1960s. In 1967/68, the Government conducted the first 3 rounds of the Malaysian Sample Survey of households. Subsequent surveys were renamed the Labour Force Survey (LFS), which have been carried out annually from 1974 to 1997 (with the exception of 1991 and 1994). The Malaysian HIS was then attached to the LFS once in every two years.[135] The LFS was designed to collect data on the labour force, employment and unemployment in Malaysia while the HIS was primarily designed to collect information on household earnings, its sources and other social indicator data such as education, health, water supply, electricity, housing and mode of transportation.[136] The main variables that are essential for this study are the earnings data, education information along with the respondent's background data.

The analysis of this chapter is based on data from the HIS, as it was in this data set that the earnings of individual Malaysians were available. The Economic Planning Unit under the Prime Minister's Department made this data set available to us for analysis.[137] The sample consisted of randomly selected individuals of both genders aged 0 to 98. The 1997 HIS survey collected data from a total of 171,792 individuals from all over Malaysia, in Peninsular Malaysia and East Malaysia.

From our knowledge, there are no recent published studies that have used the HIS data set[138] for any rates of return to education analysis. The advantage of using this data set is

[135] There were periods where the HIS was carried out once in 3 years instead of the bi-yearly trend.
[136] However, the data that was made available for analysis were data on earnings, including transfer payments and background variables such as gender, highest level of education achieved, occupation, usual activity status, etc. It was not possible to merge the two 1997 data sets, the LFS and HIS, as a common variable needed for the merging process was removed by the Department of Statistics (for reasons not stated).
[137] A letter requesting for permission to use the data was submitted in April 1999 and approval was granted in June 1999. As part of the agreement to use the data, all analysis had to be processed within the premises of the Economic Planning Unit in Malaysia. The analysis was carried out in June 2000 to September 2000.
[138] Hoerr (1967) used the 1967/68 data to calculate the returns to education utilising the cost-benefit analysis (the results are discussed in Chapter 4).

that it will provide us with results that are representative of the Malaysian population in addition to producing reasonably updated returns to education in Malaysia.

6.2.1 Variable Definition and Description

a) Earnings

The earnings data in the HIS were divided into three main categories and each category contained detailed sub-categories. This collection of annual earnings data was available according to total paid employment income data which consisted of the following component: -

- Wages and salaries (before deduction of earnings tax, the Employees' Provident Fund contribution and other deductions)
- Allowances such as cost of living allowances, specialist allowances and so on
- Bonuses
- Other cash such as commissions, tips, earnings from overtime work and so on
- Free or concessional food, free or concessional lodging, free or concessional consumer goods and services
- Other payments received in kind and the employer's contribution to EPF, SOSCO and so on.

The second category of earnings in the HIS is the 'total income from self-employment', which was further divided into earnings from agriculture and non-agriculture. The third category of earnings is the total of 'other earned income'. The other earned income consisted of imputed rent of owner-occupied house, rent from houses or other property (includes rent from both land and house together) and rent from lodging. This set of income data collected can be said to be a comprehensive measure of an individual's earnings in Malaysia, as we believe that no other data set would contain such details.

For the purpose of this research, the first two categories of earnings are used. We have omitted the other earnings or income categories as they do not constitute money earned from work or employment. We have also not utilised the transfer payment data, as we are interested in obtaining gross income (GROSSE) in Malaysian Ringgit (RM), of which the logarithm values will be used as the dependent variable (LNGROSS).

The right hand side variables are as follows: -

b) AGE and AGE^2

These two variables are common proxy variables used to measure work experience.

c) Education Levels

The education levels are determined according to information received on the highest certificate obtained by the respondent. Based on the information collected in the Household Income Survey 1997, 6 levels of education can be derived (See Table 6.1).

In the full sample, a total of 10 percent of the sample had lower secondary qualification while 14 percent of them had an upper secondary qualification. Four percent were pre-university qualification holders while 2 percent were university degree holders. The percentage of the sample that were in the no certificate obtained category is 45 percent and 24 percent of the sample did not have any formal education.

Within our labour force sample, i.e. those aged 15 to 64, 13 percent were lower secondary qualifiers and 28 percent were upper secondary qualification holders. At the higher educational levels, 9 percent were pre-university qualifiers while 4 percent were degree holders. On the other end, 40 percent of the labour force had no certificates and 6 percent had no formal education.

Table 6.1: Summary of the Education variables in the 1997 HIS dataset

Variable	Description
NOFED	Respondents aged 9 and above not attending school are placed under this category. The NOFED also refers to those who had not gone through the formal education system, i.e. those who had informal education given to them. This latter group refers to those who had attended religious studies taught out of the formal school system.
NOCERT	This refers to those who have yet to complete their first level schooling or yet to complete the stages which would allow them to obtain a certificate and those who had finished school without obtaining a certificate.
LOWSEC	Certificates equivalent to the Malaysian Lower Certificate of Education
UPPSEC	Certificates equivalent to the Malaysia Certificate of Education. It includes the Malaysia Certificate of Vocational Education.
PREUNI	Completed STPM (the Malaysian Higher School Certificate) or certificates equivalent to this level (e.g. DIPLOMA).
HIGHED	Bachelors, Masters or PhD or other doctorates.

Notes: -

The formal education system does not include the following: -

i) Religious institutions where only religious subjects are taught

ii) Education through mail correspondence

iii) Schools or colleges, which conducts special skills training such as for commerce, television repairs, etc.

iv) Schools for those with special needs (institutions where academic subjects are not taught)

v) Kindergartens/nurseries

d) Hours worked per week

This variable is the number of hours worked in the previous week. It is taken from the Labour Force Survey (LFS) whereby the number of hours worked refers to the week before the reference week (i.e. the week of which the interview was being conducted). The logarithm value of this variable is used as a right hand side variable (LNHOUR).

It should be noted that this number of hours worked may not depict an average or typical week of work. The question used to obtain this figure is, *"How many hours did you work last week? (Including extra work, work on secondary job, etc)"*. Based on the question asked, the number of hours worked may be more than a typical week if the respondent had indeed worked on a secondary job or had to perform some over time work in that particular week.

We cross-tabulated the principle employment status (which was gauged in the Labour Force Survey) with the usual activity status (collected in the HIS) to obtain close estimates of the incidence of secondary job holding.

Among the employers, 3 percent of them were also employees and a small fraction of them claimed that they were unpaid family workers too. The incidence of holding on to a secondary job was low among the employees. Less than 1 percent of the employees claimed that they had their own business (hence, having a principle employment status of an employer and own account worker) or were unpaid family workers.

Nearly half of the housewives (48 percent) claimed themselves to be employees on a secondary job while 24 percent of them were own account workers and 27 percent of them unpaid family workers. Given that there were incidences of a secondary job holding, the number of hours worked may be overstated in the HIS dataset.

The number of hours worked could also be understated in the case where the respondent may have been on leave/vacation or may have been ill. Therefore, there could be a slight measurement error bias in using this variable but it is the best estimate of the number of hours worked that we have given this data set.

We cannot ignore the possibility that a person could be unemployed for part of the year and the information on the number of weeks worked in a year would have allowed us to then use weekly wages as our dependent variable. However, in the Malaysian LFS, no specific question is asked on the total number of weeks that the respondent had worked in a year.[139]

e) Marital Status (MARRY)

As per Chapter 5, this is a dummy variable indicating the respondent's marital status. The 1 dummy represents a married individual while a 0 dummy is used if otherwise. An individual is considered as not married if he/she is single, separated, divorced or if he/she is a widow or widower. In the full sample data set, a total of 39 percent of the respondents were married while the remaining 61 percent of the respondents were single, separated or divorced or are a widow or widower. The majority of those grouped under the not married category were singles, i.e. never married (56 percent). However, within our labour force sample, the figures are flipped the other way around. We have 66 percent of the labour

[139] All labour force particulars were collected based on the week before the reference week.

force respondents married and the remaining 34 percent of them single or separated or divorced or are a widow or widower.

Out of the 66 percent of married respondents in the labour force, 13 percent were lower secondary qualification holders, 25 percent upper secondary qualification holders, 9 percent pre-university qualifiers and 5 percent were university degree holders. Six percent had no formal education while 42 percent of married respondents did not obtain any certificate. The figures for those with MARRY=0 are 15, 32, 9, 3 percent for the lower secondary, upper secondary, pre-University and degree qualification holders respectively while those with no formal education formed 5 percent of the total 'single' sample. Thirty-five percent of the singles did not obtain any certificate.

f) Sex

As the survey contained both randomly selected males and females, a dummy variable (MALE) was created, where a 1 is given to a male and a 0 indicates a female respondent. In total, there was an almost equal sample of males and females (49:51). However, in our sample for analysis, i.e. those in the labour force, there was a skew towards the males. The male female ratio in our sample for analysis is 66:34.

In terms of highest certificate obtained, it appears that the difference between the two genders is 4 percentage points at the lower secondary level (15 percent males and 14 percent females having obtained this level of certificate). At the upper secondary level, 25 percent of males and 32 percent of females are certificate holders of this educational level. At the tertiary level, there are a total of 4 percent males and 4 percent of females who have obtained a University degree. Eight percent of males and 12 percent of females are pre-university qualifiers. It is at the no formal education level that we see a 3 percentage points difference between the two genders. Five percent of males did not have any formal education while 8 percent of the females are in similar conditions. A 10-percentage point difference is observed at the no certificate obtained level, upon which 43 percent of males and 33 percent of females did not obtain any certificate.

g) Employment Status

The employment status of a respondent is extracted from the information given by the respondents pertaining to their usual activity status. The question asked was: *"What did ________(name) do MOST OF THE TIME during the last twelve months?"* Responses included the following main categories: self-employed/employer, employee, unpaid family worker, housewife/looking after house, student, child not at School and others.[140]

Under this usual activity status, there are the employers/self-employed (8 percent), employees (28 percent), unpaid workers (2 percent), housewives (15 percent) and 26

[140] In the definition of the labour force, the latter two categories will no longer be relevant. Therefore, in our discussion we have not included these two groups of children.

percent of the respondents were students. Fifteen percent of them were children not at school and 6 percent of the respondents were coded under the others category in the full sample. Within our labour force sample, there are 2 percent of employers/self-employed persons, 76 percent of employees, 0.3 percent of unpaid workers, 2 percent housewives and 0.5 percent of students.

The three main employment status dummy variables created are EMPLOYERS, which comprises of both the employers and own account workers, EMPLOYEE and UNPAID, representing the unpaid workers. The definition[141] of each category of activity appears similar to the ones used in the Malaysian Family Life survey as detailed in Chapter 5.

	Employer (%)	**Employee** (%)	**Unpaid** (%)
NOFED	57	35	57
NOCERT	14	3	10
LOWSEC	11	14	12
UPPSEC	14	31	18
PREUNI	3	11	3
HIGHED	2	5	0
Total (in absolute figures)[142]	12738	47673	187

[141] An employer is a person who operates a business, a plantation or other trade and employs one or more workers to help him. An employee is a person who works for a public or private employer and receives regular remuneration in wages, salary, commission, tips or payment in kind. An own account worker (which we have combined with employer) is a person who operates his own farm, business or trade without employing any paid workers in the conduct of his farm, trade and business (parenthesis added). An unpaid family worker is a person who works on a farm, business or trade operated by another member of the family without receiving pay or wages. (Malaysia,1998b)

[142] The total percentage within each column may not add up to 100 percent (± 1 percentage point) because of the rounding up process.

The above table shows the percentages of the total sample with the highest certificate obtained according to their usual activity status or their employment status. From the table, we find that the majority of employers appear to have not obtained any certificate (57 percent) while 11 percent of employers have obtained the lower secondary certificate. Fourteen percent of them are upper secondary certificate holders while a small percentage of them have pre-university (3 percent) or a university qualification (2 percent). Among employees, 35 percent of them have no certificates, 14 percent with lower secondary qualification and 31 percent of employees have an upper secondary qualification. A much higher percentage of employees are pre-university certificate holders compared to the employers' category (11 percent of the employees in total) and 5 percent of employees have a tertiary degree. Only 3 percent of the employees have no formal education.

The majority of unpaid family workers appear to be those without any certificate obtained (57 percent), 12 percent of them have a lower secondary certificate while 18 percent of them have an upper secondary certificate. There are no unpaid family workers with a University degree while 10 percent of them have no formal education (the second highest category of employment status without any formal education).

h) Location

Malaysia is divided into Peninsular Malaysia and East Malaysia. In Peninsular Malaysia, it is further divided into 12 states, comprising of the states of Johor, Kedah, Kelantan, Malacca, Negeri Sembilan, Pahang, Penang, Perak, Perlis, Selangor, Trengganu and Kuala Lumpur. The East Malaysian states consist of Sabah, Sarawak and Labuan Federal Territory. A dummy variable, PM is created to distinguish the two main locations in Malaysia. A 1 indicates that the respondent lives in a state in Peninsular Malaysia and a 0 otherwise.

Among the East Malaysians in the sample, 14 percent of them were lower secondary certificate holders, a figure almost on par with the 13 percent of Peninsular Malaysians having a similar qualification. There were however a bigger percentage of Peninsular Malaysians with an upper secondary qualification, i.e. 30 percent in Peninsular Malaysia and 19 percent among the East Malaysians. At the pre-university level, 6 percent of the East Malaysians and 10 percent of Peninsular Malaysians in the sample were either STPM or diploma holders. The Peninsular Malaysia sample had a lower percentage of respondents without any formal education (5 percent in Peninsular Malaysia and 11 percent in East Malaysia). Similar conditions were found at the no certificate obtained level (38 percent in Peninsular Malaysia and 47 percent in East Malaysia).

i) Citizenship.

Although a majority of the respondents interviewed in the full sample were Malaysians (95 percent), a small percentage of the respondents were non-Malaysians. The non-Malaysians in the entire sample consisted of Singaporeans (0.1 percent), Indonesians (3 percent), Filipinos (1 percent), Thais (0.1 percent) and those holding other citizenships (1 percent). In the labour force, 93 percent are Malaysians, 0.1 percent Singaporeans, 4 percent Indonesians, 1 percent Filipinos, 0.2 percent Thais and 1.4 percent of the other nationalities. We created a dummy variable, MSIAN to distinguish between the Malaysians (MSIAN=1) and the non-Malaysians (MSIAN=0).

Out of the labour force sample, 14 percent of total Malaysians in the sample have completed their lower secondary education while 16 percent of the Singaporeans in the sample have similar qualification. Among the Indonesians, Filipinos and Thais, the percentage with lower secondary qualifications are 7 percent, 8 percent and 2 percent respectively. Twenty-nine percent of Malaysians and 17 percent of Singaporeans have upper secondary qualification. Seven percent of Indonesians, 3 percent of the Filipinos and none of the Thais in the 1997 Malaysian labour force possessed such qualification. Majority of the Indonesians does not appear to be certificate holders (73 percent of them did not have any education certificate). This is not surprising as in the 1980s; there was a major influx of unskilled Indonesian workers into Malaysia with the shortage condition of low skilled workers in Malaysia. The statistics in the HIS is probably reflecting the constant existence of this group of workers.[143]

[143] Indonesian workers are mainly found in the plantation, construction sectors and in the service sector as domestic maids. In 1985, a Memorandum of Understanding was signed with the Philippines to import domestic maids and a year later, permission was given to employers to employ Thais for the plantation and construction sectors (UNESCO, 2000)

At the higher levels of education, 9 percent of Malaysians were pre-university qualifiers while 4 percent of them were university degree holders. Among the Singaporeans, there were 19 percent of pre-university qualifiers and 6 percent of degree holders. There were only 2 percent of Indonesians interviewed in the HIS 1997 who were pre-university qualifiers while among the Filipinos; there were 6 percent of pre-university qualifiers. The Thais had a lower percentage of 1 percent with this qualification. At the university level, a negligible number of Indonesians in the sample were tertiary degree holders (0.4 percent) while 3 percent of the Filipinos were graduates and 1 percent of the Thais surveyed in the HIS 1997 were university degree holders.

j) Stratum

Three more dummy variables were created to indicate respondents from the metropolitan cities/towns (METRO), the urban areas (URBAN) and the rural areas (RURAL). The stratum is determined according to the definition set by the Department of Statistics.

A metropolitan town is a town or city where 75,000 and above people reside. An urban large town will contain a total population of 10,000 to 74,000. Urban small towns are towns with a total population of 1,000 to 9,999. These latter two are combined to form URBAN while the remaining towns with populations less than 1,000 are defined as rural.

In the full sample, 40 percent of the sample were living in metropolitan towns, 18 percent in urban towns and the remaining 40 percent of respondents were living in rural areas all over Malaysia. Within the labour force sample, 44 percent lived in the METRO areas while 18 percent were in the URBAN areas. The remaining 33 percent lived in the RURAL areas.

Looking at the highest certificate obtained by the labour force sample within each stratum category, we find that the proportions of the tertiary degree holders are as follows. Six percent of the total respondents lived in the METRO areas compared to 4 percent in the URBAN areas and 2 percent in the RURAL areas.

At the pre-university level, 11 percent of those in the metropolitan towns are either STPM or diploma holders while 9 percent of the urbanites and 6 percent of the rural population in the sample have similar education qualification. The spread of those with a lower secondary qualification is about equal in the metropolitan and urban towns (14 percent in the METRO areas and 13 percent in the URBAN areas). In the rural areas, there are 10 percent of respondents with a lower secondary qualification.

Thirty-two percent of the metropolitan respondents in the sample are upper secondary qualification holders while 29 percent of the urbanites interviewed have similar qualification. The respondents in the rural areas are not far behind at 21 percent.

As we would have expected, the percentage of those without any formal education increases as we move along the different stratums (3 percent in METRO, 4 percent in URBAN and 10 percent in RURAL). We see the same pattern at the no certificate obtained level (32 percent among the METRO stratum respondents, 40 percent among the URBAN stratum respondents and almost half (48 percent) of the RURAL stratum respondents have no certificate).

This section describes the variables used to formulate the next section's estimation results. The detailed description of the highest education certificate obtained among the various groups is to provide a rough picture of the educational situation in Malaysia in 1997. The next section details the estimation results of the returns to the various level of education for the labour force in Malaysia, i.e. those aged 15 to 64. The analysis is also carried out according to gender, males and females. As we will look into a sub-divided group of individuals, Table 6.2A to Table 6.2C details the summary statistics for the variables used for the different groups of individuals analysed.

Table 6.2A: Descriptive statistics – Overall sample, Age 15-64

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
SEX	62421	1.335	0.472	1	2
AGE	62421	35.462	11.385	15	64
AGE^2	62421	1387.181	874.763	225	4096
LNHOUR	59139	3.838	0.309	0	5.124
NOFED	62420	0.059	0.236	0	1
NOCERT	62420	0.398	0.489	0	1
LOWSEC	62420	0.134	0.341	0	1
UPPSEC	62420	0.275	0.447	0	1
PREUNI	62420	0.090	0.286	0	1
HIGHED	62420	0.044	0.205	0	1
GROSSE per annum (Malaysian Ringgit)	62421	15985.81	24897.64	0	2100000
LNGROSS	62421	9.228	1.020	2.079	14.557
MALE	62421	0.665	0.472	0	1
MARRY	62417	0.662	0.473	0	1
PM	62421	0.797	0.402	0	1
MSIAN	62372	0.928	0.258	0	1
EMPLOYER	62421	0.204	0.403	0	1
EMPLOYEE	62421	0.764	0.425	0	1
UNPAID	62421	0.003	0.055	0	1
METRO	62421	0.438	0.496	0	1
URBAN	62421	0.177	0.382	0	1
RURAL	62421	0.370	0.483	0	1

Table 6.2B: Descriptive statistics – Male sample, Age 15-64

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	41495	36.450	11.495	15	64
AGE^2	41495	1460.71	896.967	225	4096
LNHOUR	39676	3.865	0.283	0.693	5.124
NOFED	41494	0.049	0.215	0	1
NOCERT	41494	0.433	0.496	0	1
LOWSEC	41494	0.145	0.352	0	1
UPPSEC	41494	0.253	0.435	0	1
PREUNI	41494	0.076	0.265	0	1
HIGHED	41494	0.044	0.205	0	1
GROSSE per annum (Malaysian Ringgit)	41495	18218.12	27092.89	15	1279200
LNGROSS	41495	9.397	0.924	2.708	14.062
MARRY	41491	0.709	0.454	0	1
PM	41495	0.790	0.407	0	1
MSIAN	41458	0.924	0.265	0	1
EMPLOYER	41495	0.230	0.421	0	1
EMPLOYEE	41495	0.751	0.432	0	1
UNPAID	41495	0.003	0.052	0	1
METRO	41495	0.420	0.494	0	1
URBAN	41495	0.179	0.383	0	1
RURAL	41495	0.386	0.487	0	1

Table 6.2C: Descriptive statistics – Female sample, Age 15-64

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	20926	33.504	10.904	15	64
AGE^2	20926	1241.378	809.479	225	4096
LNHOUR	19463	3.783	0.348	0	5.124
NOFED	20926	0.080	0.272	0	1
NOCERT	20926	0.328	0.469	0	1
LOWSEC	20926	0.112	0.315	0	1
UPPSEC	20926	0.319	0.466	0	1
PREUNI	20926	0.117	0.321	0	1
HIGHED	20926	0.044	0.206	0	1
GROSSE per annum (Malaysian Ringgit)	20926	11559.280	19082.000	0	2100000
LNGROSS	20926	8.892	1.113	2.079	14.557
MARRY	20926	0.568	0.495	0	1
PM	20926	0.810	0.392	0	1
MSIAN	20914	0.937	0.243	0	1
EMPLOYER	20926	0.153	0.360	0	1
EMPLOYEE	20926	0.789	0.408	0	1
UNPAID	20926	0.004	0.060	0	1
METRO	20926	0.475	0.499	0	1
URBAN	20926	0.173	0.378	0	1
RURAL	20926	0.340	0.474	0	1

6.3 ESTIMATION RESULTS

The results of the regression on equation (6.1) presented in the introduction will be examined according to the sample analysed. The first sub-section of the estimation results will present the results obtained for the overall sample followed by the results for the male sample and later on by the female sample.

6.3.1 Overall Sample

Table 6.3 details the human capital earnings function regression results for the overall sample. Column (1) in Table 6.3 shows the regression results of the impact of education alone on earnings after controlling for AGE and AGE^2. When we analyse the impact of an educational level, the reference category is those who do not have any formal education (NOFED). As we move along the columns in Table 6.3, an additional variable is added to the regression. Column (2) includes the marital status dummy; MARRY while column (3) includes the logarithm of hours worked per week. Column (4) displays the regression results with the gender dummy variable, MALE while column (5) and (6) allow for control in terms of location and citizenship by inclusion of the PM and MSIAN dummy variable respectively. Columns (7) and (8) are the results of the regression with the employment status variables and the stratum dummy variables, URBAN and RURAL respectively. In the former case, the reference group is EMPLOYERS, while in the latter case the reference group is METRO.

In column (1), all education levels appear to indicate positive returns to individuals in 1997. The higher the level of education, the higher the average returns relative to those without any formal education (NOFED). The results indicate that a little bit of education is better than nothing as those with some education (indicated by NOCERT) are getting positive returns of an increase in earnings of 84 percent. At each level of education, we find that the coefficient is highly significant at the 1 percent significance level.

When the marital status dummy, MARRY is added (column (2)), we find that income increases by 12 percent for those who are married. The MARRY variable can be said to be an interesting variable to include into the earnings function. In studies such as that carried out by Korenman and Neumark (1991), Gray (1997) and Cornwell and Rupert (1997) provide insights into the marriage industry where it is claimed that married men get higher wages than non-married men. These studies also find that married women are less productive (based on the finding that a married woman is paid less than their non-married counterparts) than non-married women. The argument that stands is that married men are seen to be more productive as they are not 'distracted' by household responsibility and hence can contribute the necessary effort to work which renders a higher pay than those who are not married. In one available study on Malaysia, it was found that those who are married would earn about 6 percent more than those who are not married (this results refers to that obtained in Lee and Nagaraj, 1995). The results of this variable will be discussed further in the later sections when we sub-divide the discussion to the female and male samples. When the MARRY variable is added, the various education variables continue to indicate high returns, only reducing by 1 to 2 percentage points from the results in column (1).

The impact of working an extra hour appears to be high. In column (3) of the results, an increase of 0.69 percent in earnings occurs when an individual increases their working hours by one percent. The education variables remain highly significant at the 1 percent significance level even though the coefficients are reduced by 5 percentage points (for the HIGHED level) to 9 percentage points for both LOWSEC and the NOCERT level. At the PREUNI level, we find that the coefficient has increased by 2 percentage points from the results in the previous column.

The gender dummy variable, MALE is positive and highly significant as displayed in column (4). There appears to be a large wage disparity between males and females in Malaysia. The coefficient indicates that males are earning about 49 percent more income than females. The impact of the different education levels are further reduced by between 3 percentage points (at the PREUNI level) to 8 percentage points (at the LOWSEC level).

The marital dummy variable, MARRY indicates a much lesser increase in earnings after we control for the individual's gender. It is positive and significant with a 5 percent increase in earnings for a married individual as compared to the 13 percent increase in earnings indicated in column (2).

Individuals living in Peninsular Malaysia appear to be earning 14 percent more than those living in East Malaysia (results displayed in column (5)) and in column (6), we find that Malaysians earn 21 percent more than the non-Malaysians interviewed in the HIS 1997. All education variables remain positive and highly significant.

The impact of the various education levels are further reduced when we include the employment status variables, i.e. EMPLOYER, EMPLOYEE and UNPAID. The largest reduction, i.e. from results in column (6) to results in column (7), is observed at the PREUNI level where average returns are reduced from 136 percent to 129 percent. All three categories of employment status variables are positive and highly significant. The higher coefficient obtained on the EMPLOYEE variable compared to the EMPLOYER coefficient suggests that employers are earnings slightly more than those who opt to go into self-employment (a difference of 20 percentage points which is statistically significant at the 1 percent significance level).

Table 6.3: Age 15 – 64, Overall Sample: Human Capital Earnings Function

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	5.746*** (0.042)	5.936*** (0.044)	3.756*** (0.059)	3.869*** (0.057)	3.798*** (0.057)	3.582*** (0.059)	2.357*** (0.066)	2.759*** (0.066)
AGE	0.141*** (0.002)	0.128*** (0.003)	0.099*** (0.002)	0.102*** (0.002)	0.101*** (0.002)	0.102*** (0.002)	0.091*** (0.002)	0.088*** (0.002)
AGE^2	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
NOCERT	0.610*** (0.020)	0.598*** (0.020)	0.504*** (0.015)	0.432*** (0.014)	0.410*** (0.014)	0.393*** (0.014)	0.371*** (0.014)	0.336*** (0.014)
LOWSEC	0.886*** (0.022)	0.872*** (0.022)	0.779*** (0.017)	0.699*** (0.016)	0.671*** (0.016)	0.635*** (0.016)	0.597*** (0.015)	0.533*** (0.015)
UPPSEC	1.140*** (0.021)	1.126*** (0.021)	1.048*** (0.016)	1.006*** (0.015)	0.968*** (0.015)	0.927*** (0.015)	0.873*** (0.015)	0.797*** (0.015)
PREUNI	1.461*** (0.023)	1.446*** (0.023)	1.463*** (0.017)	1.435*** (0.017)	1.399*** (0.017)	1.364*** (0.017)	1.294*** (0.016)	1.210*** (0.016)
HIGHED	2.195*** (0.025)	2.179*** (0.025)	2.128*** (0.020)	2.073*** (0.020)	2.035*** (0.020)	2.011*** (0.020)	1.954*** (0.019)	1.842*** (0.019)
MARRY		0.116*** (0.009)	0.086*** (0.007)	0.040*** (0.007)	0.046*** (0.007)	0.040*** (0.007)	0.051*** (0.007)	0.068*** (0.007)
LNHOUR			0.698*** (0.012)	0.615*** (0.012)	0.617*** (0.012)	0.639*** (0.012)	0.569*** (0.012)	0.520*** (0.012)
MALE				0.400*** (0.007)	0.403*** (0.007)	0.405*** (0.007)	0.387*** (0.006)	0.401*** (0.006)
PM					0.129*** (0.008)	0.115*** (0.008)	0.094*** (0.007)	0.095*** (0.007)
MSIAN						0.191*** (0.011)	0.224*** (0.010)	0.213*** (0.010)
EMPLOYER							1.566*** (0.039)	1.606*** (0.038)
EMPLOYEE							1.773*** (0.039)	1.784*** (0.037)
UNPAID							0.340*** (0.091)	0.416*** (0.091)
URBAN								-0.101*** (0.007)
RURAL								-0.275*** (0.006)
R^2	0.28	0.28	0.36	0.40	0.40	0.41	0.46	0.48
Sample Size	62,420	62,416	59,134	59,134	59,134	59,091	59,091	59,091

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 10 percent significance level
** is significant at the 5 percent significance level
***is significant at the 1 percent significance level

When we include the stratum variable (column (8)), we find that the HIGHED variable coefficient is reduced by 11 percentage points while the UPPSEC and PREUNI coefficients are reduced by 8 percentage points. The NOCERT and LOWSEC coefficients decrease by 4 and 6 percentage points respectively. The analysis indicates that individuals residing in the URBAN and RURAL areas are earning 10 and 28 percent less than those living in the METRO towns. Wage disparity between males and females continue to be large as the results reveal that if the individual is a male, his earnings increases by 49 percent. The results also reveal that married individuals earn 7 percent more than those who are not married, i.e. singles, divorced and widowed individuals. Earnings increases by 24 percent for Malaysians and Peninsular Malaysians earn 10 percent more than East Malaysians.

Using the regression results in column (8), the marginal gross returns[144] to successive levels of education in 1997 are approximately 8 percent for the NOFED to NOCERT level, 4 percent for the NOCERT to LOWSEC[145] level; and for the LOWSEC to UPPSEC level, UPPSEC to PREUNI level, PREUNI to HIGHED level, the figures obtained are 14 percent, 23 percent and 17 percent respectively.

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[144] This is calculated using the equation presented in chapters 3 and 5. The numbers of years of schooling used to calculate the successive levels of education are the same as those used in the previous chapter.

[145] For these two successive levels of education, the number of years of schooling used is 4.5 (the median of the number of years of schooling of a person who had completed up to the LOWSEC level, as we do not have the exact number of years of schooling that an individual at the NOCERT level has gone through.

Based on the results of the overall sample, we find very strong evidence (by the fact that the variables are highly significant at the 1 percent significance level) of positive returns to every level of education in 1997. Even after having controlled for various variables thought to affect earnings, the results indicate that some education is beneficial as the final analysis (in column (8)) shows that those at the NOCERT level have increased earnings of 33 percent compared to the reference group, the NOFED. Returns to a pre-university qualification holder are also found to be high and significant with average returns of 121 percent.

Having discussed the various regression results, we conducted a test for parameter stability between the male and female equation. The test applied for this purpose is the Chow test.[146] The table below lists the F-test and the critical F-value for the individual regressions (we have 7 regressions in total) that we have analysed.

[146] The Chow test formula used is as follows: -

$$\frac{\dfrac{ess\_c-(ess\_m+ess\_f)}{k}}{\dfrac{ess\_m+ess\_f}{(N\_m+N\_f)-2k}}$$

where ess_c is the residual sum of square of the pooled model, ess_m and ess_f is the residual sum of squares for the male and female sample respectively, k is the number of parameters (including the constant), N_m and N_f is the male and female sample size respectively.

F-test and critical F-values

Regression[147]	F-Test	Critical F-value
Column (1)	836.343	$F(8, 62404)_{0.01} = 2.511$
Column (2)	739.719	$F(9, 62398)_{0.01} = 2.411$
Column (3)	492.333	$F(10, 59114)_{0.01} = 2.321$
Column (5)	461.523	$F(11, 59112)_{0.01} = 2.250$
Column (6)	426.789	$F(12, 59067)_{0.01} = 2.185$
Column (7)	387.903	$F(15, 59061)_{0.01} = 2.040$
Column (8)	381.930	$F(17, 59057)_{0.01} = 1.967$

The F-test reveals that we are able to reject the null hypothesis at the 1 percent significance level. This indicates that there is no parameter stability between the male and female sample. This suggests that the earnings equation for males and females do differ. Hence, it would be appropriate to look into the male and female sample separately for further insights.

6.3.2 Male Sample

Table 6.4 displays the regression results for males aged 15 to 64 in the HIS 1997. In general, the signs of the coefficients are as expected and are directionally similar to that found in the overall sample. The column description is similar to that as described in section 6.3.1, the overall sample analysis.

Returns to university level qualification holders relative to those without any formal education are the highest out of all the different education levels as displayed in column (1)

[147] The regression in Column (4) of Table 6.3 is omitted as the gender variable is dropped when we run the male and female earnings regression separately.

of Table 6.4. Married men are found to earn a higher income of 11 percent more than non-married men (column (2)). This 11 percent difference falls within the typical range of 10 to 40 percent found in studies investigating the marriage industry and productivity (Korenman and Neumark, 1991). Returns to the different levels of education increases when the LNHOUR variable is included into the regression (column (3)). Returns increase by 3 percentage points for the NOCERT level, 5 percentage points for the LOWSEC level, 5 percentage points for the UPPSEC level, 13 percentage points for the PREUNI level and 7 percentage points at the HIGHED level.

Resembling the results of the overall sample, Peninsular Malaysia residents had earnings higher than those living in East Malaysia. Peninsular Malaysia males receive 17 percent higher earnings than the East Malaysian males (results in column (4)). The returns to the various levels of education in this column decreased when compared to the returns obtained in the previous column of results. These returns decreased by 3 percentage points to 5 percentage points with HIGHED maintaining the highest returns. In column (5), Malaysian men earn 23 percent higher earnings than non-Malaysian men. Returns to the various levels of education have also decreased by 4 percentage points for LOWSEC and PREUNI, 5 percentage points at the UPPSEC level, 2 percentage points for those with a HIGHED qualification and the NOCERT level when the MSIAN dummy variable is added to the regression.

The result in column (6) indicates a further decrease in the returns to education at the different levels of education when we control for the men's employment status. This decrease is relatively small compared to the decreases in the previous columns (with the exception of the results in column (3) where the returns increase) and in column (7). When we consider the stratum of the males (column (7)), the returns to the various levels of education decreases by a reasonably large figure leaving average returns of 32 percent for the NOCERT holders, 49 percent for LOWSEC, 71 percent for those with an UPPSEC qualification, 110 percent for those at the PREUNI level and 177 percent for those with HIGHED qualification.

Mazumdar (1981) obtained average returns of 180 percent for urban males possessing a university degree working in the private sector and 203 percent for those working in the public sector with similar qualifications. It would appear that the returns to a university degree for males did not change much over the period of 22 years if we were to compare our results with that obtained by Mazumdar using a 1975 data set.[148]

The marginal gross returns (using results in column (7)) to successive levels of education for this male sample, NOFED to NOCERT, NOCERT to LOWSEC, LOWSEC to UPPSEC,

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[148] It is worth noting that the proportion of those with a HIGHED qualification in 1997 is greater than that in 1975. According to the Barro-Lee educational attainment data set, 1.7 percent of Malaysia's population aged 15 and above had a tertiary level qualification in 1975 and in 1995, this proportion was 4.4 percent. We do not have the information on this proportion of tertiary qualification holders in the Mazumdar (1981) study using the 1975 MES data. However, in our 1997 data set, there are a total of 2 percent of labour force participants that have a higher education qualification.

UPPSEC to PREUNI and PREUNI to HIGHED are 7 percent, 4 percent, 12 percent, 21 percent and 18 percent respectively.

6.3.3 Female Sample

In the female sample, the returns to the various levels of education are higher than those obtained in the male sample.[149] Table 6.5 shows the results of the regression ran on the female sample aged 15 to 64 in the HIS 1997 data set.

In column (1), where the education variables are used alongside the proxies for work experience variables, returns are highest for those with a tertiary or HIGHED qualification. The female returns to a HIGHED qualification are 33 percentage points higher that that obtained in the male sample (Table 6.4, column (1)). The returns to the other education levels for females are also significantly higher than the returns to males at similar education levels. At the LOWSEC level, the difference between the returns for females and males is 26 percentage points while at the UPPSEC level, the difference is 37 percentage points. The difference is largest at the PREUNI level where the males' average returns to being a STPM or diploma holder is 118 percent compared to 160 percent for the females. Even at the NOCERT level, females with some education are earning about 10 percentage points more than the males.

[149] These results appear to conform to internationally obtained results where the returns to education for females are higher than those for males.

Table 6.4: Males only, Age 15 – 64: Human Capital Earnings Function

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	5.847*** (0.047)	6.023*** (0.051)	4.221*** (0.071)	4.132*** (0.070)	3.915*** (0.072)	2.624*** (0.090)	3.093*** (0.090)
AGE	0.158*** (0.003)	0.146*** (0.003)	0.110*** (0.002)	0.110*** (0.002)	0.111*** (0.002)	0.102*** (0.002)	0.100*** (0.002)
AGE^2	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
NOCERT	0.388*** (0.021)	0.386*** (0.021)	0.414*** (0.017)	0.384*** (0.017)	0.362*** (0.017)	0.359*** (0.017)	0.320*** (0.017)
LOWSEC	0.602*** (0.022)	0.598*** (0.022)	0.643*** (0.019)	0.605*** (0.019)	0.564*** (0.019)	0.553*** (0.019)	0.485*** (0.018)
UPPSEC	0.859*** (0.022)	0.853*** (0.021)	0.906*** (0.018)	0.853*** (0.018)	0.809*** (0.019)	0.792*** (0.018)	0.712*** (0.018)
PREUNI	1.182*** (0.026)	1.177*** (0.026)	1.310*** (0.021)	1.262*** (0.021)	1.224*** (0.022)	1.200*** (0.022)	1.106*** (0.021)
HIGHED	1.918*** (0.028)	1.912*** (0.028)	1.981*** (0.025)	1.933*** (0.025)	1.911*** (0.025)	1.896*** (0.025)	1.770*** (0.025)
MARRY		0.108*** (0.010)	0.111*** (0.010)	0.123*** (0.009)	0.114*** (0.009)	0.109*** (0.009)	0.131*** (0.009)
LNHOUR			0.590*** (0.014)	0.595*** (0.014)	0.614*** (0.014)	0.573*** (0.014)	0.508*** (0.014)
PM				0.156*** (0.009)	0.141*** (0.009)	0.125*** (0.008)	0.122*** (0.008)
MSIAN					0.206*** (0.012)	0.224*** (0.012)	0.197*** (0.012)
EMPLOYER						1.530*** (0.064)	1.597*** (0.063)
EMPLOYEE						1.637*** (0.063)	1.669*** (0.062)
UNPAID						0.152 (0.122)	0.265** (0.122)
URBAN							-0.084*** (0.009)
RURAL							-0.297*** (0.007)
R^2	0.31	0.31	0.38	0.38	0.39	0.42	0.44
Sample Size	41,494	41,490	39,671	39,671	39,638	39,638	39,638

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 10 percent significance level
** is significant at the 5 percent significance level
*** is significant at the 1 percent significance level

Table 6.5: Females only, Age 15 – 64: Human Capital Earnings Function

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	5.969*** (0.074)	5.812*** (0.077)	3.970*** (0.097)	3.922*** (0.098)	3.756*** (0.104)	2.848*** (0.107)	3.169*** (0.107)
AGE	0.118*** (0.005)	0.129*** (0.005)	0.095*** (0.004)	0.095*** (0.004)	0.096*** (0.004)	0.080*** (0.003)	0.076*** (0.003)
AGE^2	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
NOCERT	0.480*** (0.035)	0.485*** (0.035)	0.388*** (0.025)	0.372*** (0.025)	0.363*** (0.025)	0.302*** (0.023)	0.270*** (0.023)
LOWSEC	0.866*** (0.039)	0.871*** (0.039)	0.752*** (0.029)	0.734*** (0.029)	0.708*** (0.029)	0.601*** (0.027)	0.542*** (0.027)
UPPSEC	1.231*** (0.035)	1.236*** (0.035)	1.116*** (0.026)	1.091*** (0.026)	1.061*** (0.027)	0.907*** (0.025)	0.833*** (0.025)
PREUNI	1.600*** (0.037)	1.606*** (0.037)	1.569*** (0.028)	1.544*** (0.028)	1.519*** (0.028)	1.325*** (0.027)	1.250*** (0.026)
HIGHED	2.250*** (0.041)	2.258*** (0.042)	2.183*** (0.033)	2.154*** (0.033)	2.128*** (0.033)	1.953*** (0.031)	1.858*** (0.031)
MARRY		-0.096*** (0.015)	-0.085*** (0.012)	-0.087*** (0.012)	-0.089*** (0.012)	-0.054*** (0.011)	-0.044*** (0.011)
LNHOUR			0.630*** (0.020)	0.629*** (0.020)	0.648*** (0.020)	0.506*** (0.019)	0.474*** (0.019)
PM				0.101*** (0.014)	0.091*** (0.015)	0.053*** (0.013)	0.062*** (0.013)
MSIAN					0.138*** (0.024)	0.203*** (0.021)	0.225*** (0.021)
EMPLOYER						1.365*** (0.050)	1.387*** (0.050)
EMPLOYEE						1.874*** (0.046)	1.877*** (0.046)
UNPAID						0.558*** (0.141)	0.607*** (0.014)
URBAN							-0.136*** (0.013)
RURAL							-0.245*** (0.011)
R^2	0.31	0.31	0.37	0.38	0.38	0.50	0.51
Sample Size	20,926	20,926	19,463	19,463	19,453	19,453	19,453

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 10 percent significance level
** is significant at the 5 percent significance level
*** is significant at the 1 percent significance level

To make further comparisons, we will compare these results from the female sample in the HIS with the results estimated in Chapter 5 using the Malaysian Family Life Surveys. To reiterate, the Malaysian Family Life Surveys were private surveys conducted by RAND, which contained data from a group of randomly selected Peninsular Malaysia females (divided into two samples, the panel and new sample) and their children and spouses. As it would be appropriate to make comparisons with samples of similar (or as close as possible) characteristics, we will compare the results found here with that of the Panel and Children sample. We have chosen to do this based on the argument that the age group of these two groups of females is closer. The Panel and Children sample consisted of females aged 16-75[150] while in this sample; the women are aged 15-64.

To match the two samples, the regression in column (1) is ran for those aged 16-64 of the panel sample females in the MFLS and Peninsular Malaysian females in the same age group of 16 to 64 years taken from the HIS 1997. The results from the MFLS sample remain the same as that presented in Chapter 5, as only 2[151] out of the total sample were aged 65 and above. We also include our results obtained from the HIS 1989, a time period closer to the time period of the MFLS. Table 6.6 shows the results for our comparison purpose. Column (1) indicates the results using the education levels only while results in Column (2) includes the marital status variable in addition to the education variables.

[150] The new sample women were aged 18 to 49.
[151] The 2 respondents aged 64 and above were not included in the original results as they were zero income earners.

Table 6.6: Comparison of the MFLS results and the HIS results (Female sample aged 16-64)

	MFLS 1988		HIS 1989		HIS 1997	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Constant	2.075*** (0.419)	1.995*** (0.460)	4.844*** (0.066)	4.835*** (0.070)	6.078*** (0.085)	5.961*** (0.088)
AGE	0.090*** (0.024)	0.096*** (0.028)	0.154*** (0.004)	0.154*** (0.004)	0.126*** (0.005)	0.134*** (0.005)
AGE^2	-0.001*** (0.0003)	-0.001*** (0.0003)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)
NOCERT			0.397*** (0.028)	0.397*** (0.028)	0.400*** (0.043)	0.403*** (0.043)
LOWSEC	0.387** (0.189)	0.389** (0.188)	0.814*** (0.034)	0.814*** (0.034)	0.728*** (0.047)	0.732*** (0.047)
UPPSEC	0.760*** (0.112)	0.759*** (0.112)	1.115*** (0.028)	1.115*** (0.028)	1.056*** (0.044)	1.060*** (0.044)
PREUNI	1.308*** (0.140)	1.310*** (0.141)	1.499*** (0.030)	1.500*** (0.030)	1.425*** (0.045)	1.429*** (0.045)
HIGHED	2.009*** (0.145)	2.010*** (0.148)	2.239*** (0.039)	2.239*** (0.039)	2.081*** (0.049)	2.086*** (0.049)
MARRY		-0.430 (0.096)		-0.005 (0.014)		-0.069*** (0.016)
R^2	0.26	0.26	0.29	0.29	0.31	0.31
Sample Size	533	533	24486	24486	16924	16924

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
* is significant at the 10 percent significance level
** is significant at the 5 percent significance level
*** is significant at the 1 percent significance level

Directionally, the signs of the coefficients obtained in this analysis are similar to those obtained in the Panel and Children sample analysed in Chapter 5. Higher returns are observed for higher levels of education in all the analyses. Magnitude wise, the results obtained from the HIS are only slightly higher than those obtained in the previous chapter (with the exception of the results for the LOWSEC education level). The average returns for those with LOWSEC qualifications are much higher when we use the HIS data set compared to that obtained from analysing the MFLS2 data set. Average returns were 39 percent in the MFLS2 while in the HIS 1989, results indicate an average return of 81 percent and 73 percent in 1997. The differences are significant given the larger sample size in the HIS data sets.

In column (2), when the marital status dummy variable, MARRY is added to the regression, the returns to the various levels of education increases slightly in the MFLS2 and HIS 1997 results. The marital status dummy is negative and insignificant in the MFLS2 and HIS 1989 results. It remains negative in the 1997 analysis but is found to be significant at the 1 percent significance level. The negative sign allows us to suggest that married women are receiving lower earnings than single women are. This finding is however, different from that found in Lee and Nagaraj's study whereby their results indicated a positive but insignificant marriage coefficient, i.e. married women were earning a slightly higher wage level than those who were not married (the coefficient was small at 0.1 percent).

In summary, although there are significant differences in magnitude terms (especially at the LOWSEC level) between the two sets of results obtained from using the HIS data sets and that obtained in Chapter 5, it does not alter the findings that the returns to education (especially at the higher education levels) for females in Malaysia are high, positive and significant.

Returning to the current set of results, when the LNHOUR variable is included to the regression (column (3)) of Table 6.5, the returns to the various levels of education decrease, with the largest decrease of 12 percentage points for both the LOWSEC and UPPSEC level followed by a 10 percentage points decrease at the NOCERT level from 49 percent to 39 percent.

Peninsular Malaysia females are also paid higher earnings than the East Malaysia females, a finding consistent with that found among the males. The coefficient obtained in the female sample is however not as high as that found for the males (11 percent increase in earnings if the woman is located in Peninsular Malaysia compared to an increase of 17 percent in earnings for males located in Peninsular Malaysia). This strengthens the findings of a large wage gap between the males and females, as there are almost equal proportion of males and females at all levels of education achievement.

Similarly, Malaysian women are getting higher earnings than the Non-Malaysian women (an increase of 15 percent in income for Malaysian women). The returns to the various levels of education have decreased compared to the previous column of results but by a smaller decrease of between 1 percentage points (for the NOCERT level) to 6 percentage points decrease for the other education levels.

When we attempt to control for the employment status of the women (column (6)), the returns to the various levels of education are further reduced to average returns of 60 percent for the LOWSEC level, 91 percent at the UPPSEC level, 133 percent for the PREUNI level, 195 percent at the HIGHED level and 30 percent for the NOCERT level. At this stage of the results, we find that the returns to the female NOCERT level holders is lower by 6 percentage points compared to the males (Table 6.4, column (6)).

In column (7), the average returns to the various levels of education for females are 54 percent, 83 percent, 125 percent, 186 percent and 27 percent for LOWSEC, UPPSEC PREUNI, HIGHED and the NOCERT levels respectively. Comparing these results with the results of the male sample, we find that the returns to the various education levels remain relatively higher than the returns to the males at similar levels of education (with the exception of the NOCERT level). Also, in column (7), we find that urban and rural females are earning less than those in the metropolitan areas (13 percent less for those in the urban areas and 22 percent lower earnings for those in the rural areas).

The marginal gross returns for females are 6 percent, 6 percent, 16 percent, 23 percent and 16 percent for successive levels of education from NOFED to NOCERT, NOCERT to LOWSEC, LOWSEC to UPPSEC, UPPSEC to PREUNI and PREUNI to HIGHED respectively.

6.4 SUMMARY AND CONCLUSION

The updated returns to education in Malaysia using data extracted from the 1997 Household Income Survey reveals positive and highly significant returns to all levels of education. The results indicate that it is profitable for an individual in Malaysia to invest[152] and pursue to complete their education to the highest level possible.[153]

A little education is better than none (from the findings that at the NOCERT level, the average returns obtained were between 33 percent to 61 percent for the overall sample, 32 percent to 39 percent for males and 27 percent to 48 percent for females). At the LOWSEC level, returns are above 50 percent (except for the males when the full regression is used), ranging from 89 percent to 53 percent for the overall sample, 60 percent to 48 percent for the males and 87 percent to 54 percent for the females. Average private returns at the UPPSEC level range from 114 percent to 80 percent for the overall sample, 86 percent to 71 percent for the male sample and 123 percent to 83 percent for the females. The average returns are higher as we move on to the next level of education, the PREUNI level where average returns are from 146 percent to 121 percent for the overall sample, 118 percent to 110 percent for the males and 160 percent to 125 percent for the females. At the HIGHED level, returns are sometimes above the 200 percent mark, for the overall sample and the female sample. The

[152] The returns estimated here are average private returns.
[153] This is based on the general results obtained in this study. The returns may differ according to the subject of study and may differ according to the sector of employment, i.e. the public sector or the private sector. In order to determine this, a more detailed set of data is required to facilitate the investigation.

average returns range from 220 percent to 184 percent for the overall sample, 192 percent to 177 percent for the male sample and 225 percent to 186 percent for the female sample.

From the results, we observe that the higher education levels (i.e. at the PREUNI and HIGHED levels) have higher average returns. This set of results confirm the findings indicated in the past Malaysian rate of returns to education studies which have found that at the higher levels of education, higher average returns are obtained. Furthermore, our estimation of the marginal gross returns to successive levels of education as those shown in Table 6.7 also indicate this higher return to higher levels of education compared to the lower levels of education. From a policy point of view, this could indicate that there could be more private sector involvement in financing education (especially at the PREUNI level where the marginal gross returns are the highest among the other categories). Our results are similar to that found in Taiwan, where Gindling, et.al (1995)[154] found private returns to education highest for the college level and lowest for the academic and vocational senior high school and junior high school.

Table 6.7 below summarises the marginal gross returns to successive levels of education in Malaysia. To recap, the marginal gross returns show the returns to each year of additional schooling needed to move from one level of education to another.

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[154] Gindling, et.al used four methods to calculate the returns to education and found the magnitude of the return to differ depending on the method. Nevertheless, three out of the four approaches used indicated this finding of higher returns to the college level and lower returns for the senior and junior high school level as noted in the main text.

Table 6.7: Marginal gross returns to Successive Levels of Education (%), Malaysia 1997

	NOFED–NOCERT	NOCERT-LOWSEC	LOWSEC-UPPSEC	UPPSEC-PREUNI	PREUNI-HIGHED
Overall Sample	8	4	14	23	17
Male Sample	7	4	12	21	18
Female Sample	6	6	16	23	16

The marginal gross returns for each successive level are consistent throughout all the samples analysed. The highest marginal return is at the UPPSEC to PREUNI level where an individual in the sample have an annual marginal gross returns of 23 percent by moving on from the upper secondary level to the pre-university level. By gender, males get 21 percent while females receive an annual marginal gross return of 23 percent.

The lowest marginal return is obtained for the NOCERT level verses the LOWSEC level. There are two immediate responses that can be identified from such results. One, the individual may be inclined to leave the education system without completing the first stage[155] or two, if they are able to complete the lower secondary education level, they should then target to finish (at the least), the upper secondary level so as to reap a higher level of marginal gross returns. Similar findings of low marginal gross returns at the lower secondary

[155] Compulsory education up to 11 years of schooling (which covers education until the upper secondary level) is encouraged but there are times where the government is unable to exert force in ensuring that all school going children of the appropriate age completes the required amount of education (Interview with En. Amir of the Economic Planning Unit).

level were also obtained in previous Malaysian studies dating back to Lee's 1980 study.[156] In the other studies (i.e. Lee (1989)[157] and Lee and Sivananthiran (1992)[158]), which we have discussed in Chapter 4 were confined to the manufacturing sector, had also found low marginal gross returns to the lower secondary level.

On further analysis of the results presented in Table 6.7, it would appear that there are incentives for an individual (regardless of gender) to continue onto the next educational level, right up to the tertiary level. However, the fact that marginal gross returns decrease as one moves from PREUNI to the HIGHED level, this decrease may be a disincentive to some (especially to those who may be constrained financially) to proceed on to the tertiary level.[159]

If we compare these updated results with those in the past, there are mixed verdicts. In Mazumdar (1981) study using the 1975[160] MES data, those working in the public sector, marginal gross returns increased as one moved from the certificate level (which we equate to our PREUNI level) to the degree level (equivalent to our HIGHED level). The opposite occurred for those in the private sector (44.6 percent to 33.6 for the public sector workers and 9.8 percent to 33.7 percent for the private sector workers).

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[156] The data in Lee's 1980 was self-surveyed from a non-random sample of 1,179 private sector employees and 792 public sector employees in the Klang Valley (of which was discussed in Chapter 4).
[157] As presented in Chapter 4, this was the study conducted using a set of data of 2,553 employees taken from ten industries within 6 key occupations.
[158] This was the study of 1,445 employees in 8 industries within the manufacturing sector in Kuala Lumpur.
[159] It would be interesting to investigate this further, whereby a study could be conducted to gauge how employers view those with a PREUNI or HIGHED education in terms of the level of skills possessed by the individual.
[160] The findings of this study are detailed in Mazumdar (1981) of which we have discussed in Chapter 4.

occurred for those in the private sector (44.6 percent to 33.6 for the public sector workers and 9.8 percent to 33.7 percent for the private sector workers).

In the other two studies (Lee (1980) and Lee and Sivananthiran (1992)), the findings from these two studies showed an increase in the marginal returns from the PREUNI level to the HIGHED level. At this stage, it would be difficult to draw a firm conclusion with regard to the condition of the annual marginal gross returns to education. In the next chapter, we will make an attempt to solve this problem by using 6 sets of the Malaysian Household Income Survey where we will determine the pattern of the returns to education over time in Malaysia.

The results also reveal that there exists a large wage gap between males and females in Malaysia. Males obtain about 50 percent higher wages than females as revealed by the gender dummy variable, MALE. In addition to this wage disparity between the two genders, there is also a large wage disparity between the holders of the different levels of education qualification. From the results, those with a pre-university and university qualification have higher returns compared to those with lower education qualification. This gap between the two levels of education indicates that the distance between the earnings of the higher level of education, e.g. PREUNI or HIGHED to individuals with a lower education qualification, e.g. LOWSEC is large.

The findings of female returns being higher than male returns repeat findings from many other countries (as discussed in Psacharopoulos, 1994 and in Chapter 4 of this thesis). Our results contradict the results obtained in the Lee and Sivananthiran (1992) study that have found higher returns to education in Malaysia for males compared to that for females. We believe that our results are robust considering that we are analysing a larger sample size and this sample that we have used represents the Malaysian population better than the data sets which were used in the previous study.

Using the work experience proxy variables, AGE and AGE^2, we can estimate the individual's turning point where experience will contribute negatively to earnings.[161] In the overall sample, experience will add positively to earnings till the age of 45 years[162] of which after this age, earnings will decrease. For males, it is after the age of 50 years[163] that earnings will take a downward turn while for females, it occurs at a very early age of 38 years.[164]

We have summarised the salient findings pertaining to the rates of return to the different levels of education in Malaysia using the HIS 1997. An issue pertaining to the quality of the results presented here, of which is addressed in articles such as Schultz (1993),

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[161] This is calculated and adapted from Siphambe (2000), where he notes "the point where experience stops adding positively to earnings is defined by $\delta \ln Y/\delta T=0$, from the earnings function: $\ln Y=a+bS+cT+dT^2$. This is equal to $c/-2d$; $d<0$". In our equation, we have used AGE and AGE^2 to proxy for experience and experience-squared, therefore the figure obtained from the calculation can be interpreted as the point where after this age, earnings will decrease (the AGE^2 curve is an inverted 'u')

[162] Using the results in Table 6.3, column (8).

[163] Using the results in Table 6.4, column (8).

[164] Using the results in Table 6.5, column (8).

Psacharopoulos (1994), Falaris (1995), Arjun, et.al (1997) and Siphambe (2000) is the issue of correcting or adjusting female returns for selectivity bias. This selectivity bias refers to having to take account of the prior decision of a woman on whether to participate in the labour force.[165] It should be noted that we were not able to consider the self-selection issue in this study with the HIS 1997. The self-selection bias correction involves a two-stage procedure as discussed in Chapter 3 (or better known as the 2-stage Heckman procedure). We were not able to carry out the first stage of the procedure, i.e. to estimate a probit model of labour force participation due to a missing variable[166] in the HIS 1997. The missing variable did not allow us to generate the identifying variables that were essential in formulating an appropriate probit model. Due to this, we are not able to investigate the importance or impact of self-selection on the returns to education for Malaysia in 1997. We were however able to check for self-selection and its impact in the other HIS data sets. Findings of this will be reported in the following chapter.

[165] The general finding of selectivity correction (the econometric model frequently used is discussed in Chapter 3 while Chapter 4 presents some of the findings of various studies on the selectivity issue) on the returns to education by Psacharopoulos (1994) is that it does not have influence on the returns to education for females while the other studies mentioned (Falaris, Schultz, Arjun et.al) find that selectivity does matter. The later studies such as Arjun et al. and Siphambe, the selectivity bias correction procedure has also been conducted on the male samples of their analysis. Reasons that we can identify for a man not to participate in the labour force could be for educational and training purposes or in the case where the man opts to stay at home to resume the duties as a househusband. In the HIS 1997, we have 0.9 percent of males reporting themselves as homemakers.

[166] The Department of Statistics who had collected and 'cleaned' the data had removed the EBno. This EBno is the enumeration block number belonging to the household of individuals interviewed. Enumeration blocks are geographically contiguous areas of land with identifiable boundaries, each containing about 80 to 120 living quarters and about 600 persons (Malaysia, 1998). No reasons were given as to why the EBno was removed. This information was required in order to accurately match the data in the LFS and HIS.

Before moving on to Chapter 8 for policy implications of our findings for Malaysia, the next chapter will examine the trends of the returns to the different levels of education in Malaysia. This has been made possible with the availability of 5 other HIS data sets, namely HIS 1984,1987, 1989, 1992 and 1995. Analysing the movement of the returns to education trend using these available data sets could give us a better picture of the demand and supply condition of workers with various education qualifications.

CHAPTER 7

THE RETURNS TO EDUCATION OVER TIME: THE MALAYSIAN OUTLOOK

7.1 INTRODUCTION

This chapter will form a study that systematically looks at the returns to education in Malaysia over time. In the previous two chapters, we were able to estimate the returns to education and training at one point in time using two micro data sets, namely the Malaysian Family Life Survey and the Malaysian Household Income Survey. This chapter uses a series of the latter data set to meet the two-fold objective of (a) investigating the returns to education over time and (b) examining the issues linked to the results found in (a). From our knowledge, this study could be the first of its kind in Malaysia to be done as we claim to be able to present a set of results derived from a consistent set of data in terms of the design of the survey. To be able to present a set of returns to education using a consistent data set over time is rare, especially in the case of a developing country such as Malaysia.

Currently, the behaviour of the returns to education over time in Malaysia is investigated via the amalgamation of results obtained from the different individual Malaysian rate of returns to education studies that are available. Although the compiling of the different results would provide interested parties with an indication of the trend of the returns to education, we are not able to distinguish if the changes in the trend or the behaviour of the rate of returns is caused by the real changes in the returns to investment on human capital or is caused by the difference in methodology and/or the difference in the data set used. The results in this chapter could also be used as a confirming tool of the pattern or trend of the returns to education that is currently available.

The importance of examining the evidence pertaining to the returns to education over time is listed in Psacharopoulos (1989). Other than being able to match economic theory to the behaviour of changes in the trend of investments to capital (in this case, capital refers to human capital), the pattern of the returns to education over time is said to be useful for education policy makers.[167]

The general trend of the returns summarised in Psacharopoulos (1989, 1994) points toward declining returns to education over time. When Psacharopoulos deduced this firstly in his 1989 paper and later noted again in his 1994 paper by finding that there was a decrease in the annual rate of return to educational change as years of schooling increased. The findings of individual country study on Chile (Riveros, 1990), Cyprus (Demetriades and Psacharopoulos, 1987) and Kenya (Appleton, et al., 1997) displayed

[167] According to Psacharopoulos (1989), the pattern of the returns to education over time enables policy makers to estimate the elasticity of substitution between the different types of educated labour. This elasticity of substitution information could be used to assist in educational planning. In addition, the pattern of the returns to education over time allows one to analyse the impact that educational expansion may have on the returns to education in a particular country.

this general declining trend. All three countries had declining returns to education for the time period analysed.

In Chile, the returns to education were examined for the period 1960 to 1985 while in Cyprus, the study looked at the returns for two time periods, 1975 and 1984. In the latter study, the researchers were able to confirm the economic theory of diminishing marginal returns to capital when they found that returns to education declined over time with increases in the stock of human capital.[168]

In Kenya, educational expansion and an economic decline were used to explain the decline in the social returns to secondary education from 1978 to 1995. Unlike the two earlier studies for Chile and Cyprus, which used the measurement of years of schooling to calculate the returns to education, Appleton, et al. (1995) used the trend of returns to the various levels of education in Kenya. While the results indicated a decline in the social returns to secondary education, returns to primary and tertiary education did not change. Appleton, et al. deduced that the fall in benefits from primary schooling was offset by a corresponding fall in the cost of primary schooling. This offsetting effect had helped to maintain the level of returns to primary schooling. Caution was exercised in the

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[168] When there is diminishing marginal returns over time, this refers to the returns falling for a particular level of education. Alternatively, it could also refer to the overall returns to education falling over time. For example, in this Cyprus study, the returns to the secondary level decreased from 11.2 percent in 1975 to 4.5 percent in 1984 and at the higher educational level, returns decreased from 14.8 percent in 1975 to 14.1 percent in 1984. The overall returns decreased from 12.5 percent in 1975 to 11 percent in 1984.

interpretation of the results for tertiary education due to data problems and the small sample size used for the analysis. Due to the data weakness, the researchers did not conduct an in-depth analysis of the returns to tertiary education.[169]

Declining returns were also found in Costa Rica *from 1976 to 1992* (Funkhouser, *1998*). The returns to education were reported to have fallen by approximately one-quarter from the late 1970s to the mid-1980s. The interaction of demand and supply of education was used to investigate the Costa Rican pattern of declining returns. Funkhouser found returns to education to be positively related to demand for education and negatively related to the supply of education.

Using both years of schooling and the various education levels as human capital variables in separate wage equations, Fersterer and Winter-Ebmer (1999) found falling returns to education in Austria from 1981 to 1997. The decline in the returns to education using the years of schooling measurement was explained by a rising supply of skills, which was not compensated by sufficient changes in the demand for skills. At the individual education levels, falling returns were observed at the secondary (both academic and vocational streams) and tertiary levels with the latter facing the larger decrease in returns. The reason cited for this large decrease in the returns to the tertiary level of education was that

[169] Even though this was the situation, the researcher seemed convinced that there was no evidence of a fall in the returns to this level of education. They believed that the opposite effect of increasing returns to be true given the fact that there was strong political pressure in Kenya in the late 1980s to expand the country's tertiary education.

there were reduced employment opportunities with an increased supply of tertiary level graduates.

So far, the results in the studies summarised above are in no way unusual and in some instances, they provide justification to the economic theory of diminishing marginal returns to capital.

However, in the United Kingdom and the United States, increasing returns were found. The UK results are based on Chevalier and Walker's (1999) usage of the Family Expenditure Survey (FES) data fitted into a simple OLS wage regression. We have chosen to report the results from the FES because out of the 4 data sets[170] which Chevalier and Walker used, the FES results were for a longer time period of 1978 to 1995.

Results for the United States are based on that obtained by Arias and McMahon (2000) using a static cross section analysis of the annual Current Population Survey (CPS). There were increasing returns from 1967 to 1975 for high school and 5 year college education levels. An earlier study for the United States had also obtained similar findings as that found in the Arias and McMahon study. Katz and Murphy (1992) had used a more

[170] Chevalier and Walker also fitted data from the General Household Survey (GHS) 1984 to 1996 (with two year gaps between each set of data), the Family Resources Survey (FRS) 1994 to 1996 and the British Household Panel Study (BHPS) 1991 to 1996 into a simple OLS wage equation.

up-to-date compilation of the CPS data. In their paper, Katz and Murphy found increasing returns to college level education for the United States from 1964 to 1987.

Beside these studies on the UK and the USA, whose results deflect from conventional results, studies such as Gindling, et al. (1995) for Taiwan and Hægeland, et al. (1999) for Norway contribute further to the list of studies with 'unorthodox' results. In both the Taiwan and Norway studies, stable returns to education were found. The stable returns to education in Taiwan for the time period of 1978 to 1991 were explained via the interaction of the demand and supply of educated workers. The researchers deduced that relative demand for more educated workers must have increased alongside increasing relative supply of educated workers due to educational expansion. It was also reported that skill changes (due to the change in Taiwan's economic structure, i.e. from one of less skilled intensive manufacturing to one of a more skilled intensive services and manufacturing) in the Taiwanese labour market had further boosted the demand for a more educated workforce.

Hægeland, et al. attempted to use the interaction of demand and supply of educated workers to explain the stability of the returns to education in Norway. The researchers seemed convinced that because there was no rise in the returns to education in Norway, there must have been an increase in the relative supply due to educational expansion. However, we find it peculiar that the researchers did not include the demand element into their analysis when deriving their conclusion based on a demand and supply framework. Surely, demand must have increased in order for the returns to education in Norway to remain stable in the light of increasing relative supply.

A study of Brazil by Green, et al. (2000) using a set of household surveys from 1981 to 1998 indicated either a stable or declining trend in the returns to the lower level of education. They found an increasing trend (especially after 1992) in the returns to the college education level. The researchers deduced that amidst trade reforms in the country, demand for the highly skilled workers must have increased along rising supply. On the other hand, the decline in the returns to the lower levels of education was attributed to rising supply, as demand for the lower skilled workers did not appear to have increased.

Conventional wisdom also has it that the rate of returns to lower levels of education is higher than the returns to university.[171] Breaking away from these traditional results, Ryoo, et al.'s (1993) study on the Republic of Korea found returns to lower levels of education (termed as the middle school/primary school level in Ryoo, et al.'s paper) falling substantially compared to higher levels of education. Vila and Mora (1998) also

[171] In Psacharopoulos (1994), the private returns to investment for the lower levels of education were higher than the higher levels of education. For example, at the primary educational level, returns for Asia (non-OECD) was 39 percent, returns to the secondary schooling level was 18.9 percent and 19.9 percent for the higher educational level. A similar pattern was observed for the other regions, i.e. Sub-Saharan Africa, Latin America/Caribbean and the OECD.

found evidence of this unconventional behaviour for Spain in a 1998 study. This Spanish study looked into the impact of structural transformation and educational attainment expansion on the Spanish rate of returns to education. The results revealed a declining pay-off to lower and intermediate education levels between 1981 and 1991.

In both the studies conducted in Korea and Spain, structural changes in the economy were associated with the findings of the returns to education. In Korea, rapid industrialisation provided the answer to the declining rates for the lower levels of education. With industrialisation, the demand for skilled workers would have increased. This in effect increases the premium paid to those with higher skill levels, who would usually comprise those with higher levels of education. At the same time, the Korean education provider had expanded their junior and senior high school levels in order to achieve universal rates of education at this level. This expansion at the lower levels of education alongside barriers to entry to college and higher education seemed to have pushed the returns to higher levels of education above those of lower levels of education in Korea.

In Spain, the structural changes thought to have influenced the returns to education were the changes in the employment population's educational attainment and the involvement of women in both the education system and labour market. In addition, Spain was moving towards a more service-oriented economy in the 1980s. The move towards a modern service sector increased the need for higher educated white-collared workers. At the same time, in the manufacturing sector, an increase in the technicality of new production processes added on to increase the demand for higher skilled blue-collared workers. Amalgamating all the three factors with increased demand of graduates in the public sector provided an explanation to the higher returns to the higher levels of education in Spain.

In India, Duraisamy (2000) used two data sets, which were 10 years apart, a 1983 and a 1993/94 data set to examine the trends in the returns to education. The marginal returns appeared to have declined for the lower levels of education while the returns to secondary and the higher levels of education were on the increase. The female returns to education trend obtained by Duraisamy appear to follow the pattern of returns at the overall level. However, returns to education for Indian men were found to be declining at the secondary education level while the returns to the primary and tertiary education levels were relatively unchanged. The researcher used these results to note that there could be possible education expansion for females in India especially at the higher education levels.

From this review, two categories of results are prevalent. One, results that conform to the traditional findings of (a) declining returns to education and (b) higher returns to lower levels of education. Two, a set of results derived from studies whose findings deviate from conventional wisdom whereby (a) stable or increasing returns to education has been found and/or (b) higher returns are accrued to higher levels of education. These studies however, share a common analysis in the explanation of the patterns of the returns to education. The patterns obtained in these various studies are often found to conform to the movements in the demand and supply of the different type of workers (which are usually grouped into the low and high skilled workers).

In this chapter, we will take advantage of a series of the Malaysian Household Income Survey data that was made available to us to analyse the condition of the returns to education over time in Malaysia. We also wish to identify issues for discussion based on the results of the returns to education pattern/trend that we obtain in this study. This chapter will be organised as follows - the framework, containing the methodology and data will be explained in the next section, followed by the results of the regression in section 7.3. Section 7.4 will look into the issues for discussion in relation to the returns to education trends obtained and the last section will conclude the chapter.

7.2 THE FRAMEWORK

7.2.1 METHODOLOGY

The basic Mincerian Earnings Function will be utilised in this chapter. To be exact, the model used is as follows: -

$$\ln Y_i = \alpha + \gamma_1 AGE + \gamma_2 AGE^2 + \beta_i S_{DUM} + \delta_i X_i + \varepsilon_i \qquad (7.1)$$

where $\ln Y_i$ is the logarithm of annual earnings,

S_{DUM} is a list of dummy variables indicating achievement of one particular level of education.[172] There are 6 levels of education analysed, therefore we have defined 6 educational dummies (with one dropped as the reference category[173]). The education categories used in the regressions are NOCERT for those who have not completed any particular level of education, LOWSEC for those who have completed lower secondary education, UPPSEC for those who have completed the upper secondary education level, PREUNI, represents those who have completed pre-university education level and HIGHED is used for those with a university qualification,

AGE and AGE^2 are the usual proxy variables for experience and

X_i is a vector of control variables, i.e. dummy variables labelled MARRY which depicts the marital status of the respondent, MALE, a dummy variable representing the gender of the respondent and LNHOUR, the logarithm of the number of hours worked in a week,[174]

ε_i is the error term.

This analysis is taken further by considering the effects of self-selection on the returns to education. The effects of the self-selection bias can be gauged via the two-step Heckman model (Heckman, 1979) where in the first step; a conventional probit model is conducted

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[172] The full description of each level of education is as per definition presented in Chapter 6.
[173] The reference category is the NOFED education level, which refers to those without any formal education.
[174] Again, the description of each of these variables is as presented in Chapter 6.

on the sample's labour force participation. The probit equation is depicted in equation 7.2 below.

$$LFP_i^* = \mu' Z_i \tag{7.2}$$

where LFP_i^* is a latent variable measuring labour force participation, such that $LFP^* > 0$, LFP=1 while if $LFP \leq 0$, then LFP = 0. Z_i is the vector of the determinants of labour force participation.

From the probit regression analysis on equation (7.2), we will be able to draw out a correction term called the Inverse Mills Ratio (IMR). This correction term will be inserted into the earnings function as an independent variable to allow us to gauge the direction of the selection bias on our returns to education estimates (as per equation 7.3).

$$\ln Y_i = \alpha + \gamma_1 AGE + \gamma_2 AGE^2 + \beta_i S_{DUM} + \delta_i X_i + \lambda_i + \varepsilon_i \tag{7.3}$$

where the additional variable, λ, is the IMR.

The self-selection issue is conventionally raised and tested for the female samples. We maintain this conventional check and will apply the Heckman model consisting of equation (7.2) and (7.3) on the female data in our HIS data sets.

The trends and patterns of the returns to education are analysed by looking at the marginal gross returns to each successive level of education. The marginal gross returns are calculated using the formula[175] as applied in Chapters 5 and 6. It is this marginal gross return that will give us the returns to education for each additional year taken to achieve the next level of education. These marginal gross returns are then plotted onto a graph to show the pattern of the returns to each successive level of education.

7.2.2 THE DATA

The data consist of a series of the Malaysian Household Income Survey (HIS) conducted by the Department of Statistics in Malaysia. As described in the previous chapter, the HIS is primarily designed to collect information on annual household earnings, its sources and other social indicator data such as education, health, water supply, electricity, housing and mode of transportation. The HIS is conducted once in two years whereby the questionnaire is administered together with the Labour Force Survey, which is conducted annually. However, readers may find that the one in two-year interval has not been consistent. Reasons were not made known as to why this was the case. In total, six data sets[176] were available for analysis. These data sets included the 1984, 1987, 1989, 1992, 1995 and 1997 data sets. The disadvantage of this data series arises when we make an

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[175] As a reminder, the following formulae are applied to calculate the marginal gross returns.
$r_{(LOWSEC\ vs.\ NOCERT)} = [(\text{antilog } (\beta_1/S_{LOWSEC} - S_{NOCERT})) - 1]^* 100,$
$r_{(UPPSEC\ vs.\ LOWSEC)} = [\ (\text{antilog } (\beta_2 - \beta_1)/(S_{UPPSEC}-S_{LOWSEC})) - 1] * 100$
$r_{(PREUNI\ vs.\ UPPSEC)} = [\ (\text{antilog } (\beta_3 - \beta_2)/(S_{PREUNI}-S_{UPPSEC})) - 1] * 100$
$r_{(UNIV\ vs.\ PREUNI)} = [\ (\text{antilog } (\beta_4 - \beta_3)/(S_{UNIV}-S_{PREUNI})) - 1] * 100$
where S stands for the number of years of schooling of the subscripted educational level (S_{NOCERT}=4.5, S_{LOWSEC}=9, S_{UPPSEC}=11, S_{PREUNI}=13 and S_{UNIV}=17). The number of years of schooling for each level of education is assumed to remain constant over time.
[176] The permission to use these six data sets was granted by the Malaysian Government via the Economic Planning Unit in September 2000 when the researcher was in Malaysia to conduct the analysis on the 1995 *Household* Income Survey data.

attempt to investigate the self-selection bias issue on our returns to the different levels of education. The analysis on this self-selection issue can only be conducted on 5 out of the 6 data sets.[177]

The survey population included all those living in private quarters in the whole of Malaysia. This definition of survey population does not include persons living in institutions such as hotels, hostels, hospitals, boarding schools, military barracks and the prisons (Malaysia, 1998b). There were no significant changes in the questionnaire used in all 6 years; hence we can say that the results are free from any bias due to changes in the questionnaire design.

The data from each year are fitted into equations (7.1) to (7.3)[178] and the results of this analysis will be presented in the next section. Consistent with the analysis in the previous empirical sections, the analysis is confined to those in the labour force, i.e. those aged 15 to 64 years old. The following table lists the sample sizes that were available for analysis while descriptive statistics for each year and its relevant sample are presented in the appendix of this chapter (Tables (i) to (xv)).[179]

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[177] As noted in the previous chapter, due to missing variables, the self-selection issue cannot be conducted for the year 1997.
[178] Equation (7.2) and (7.3) will only be applied on the female data that we have.
[179] We have not included the descriptive statistics table for 1997 as it can be found in Chapter 6.

Year	Sample Size Analysed	Year	Sample Size Analysed
1984	75,643	1992	86,522
1987	82,027	1995	57,986
1989	85,527	1997	59,134

7.3 THE RESULTS

Using the framework presented in section 7.2.1, the following results will be presented.

- The marginal gross returns to education trend for the overall sample and by the two genders, males and females, without the self-selection correction.
- The marginal gross returns to education trend for the female sample, after correcting for self-selection bias.

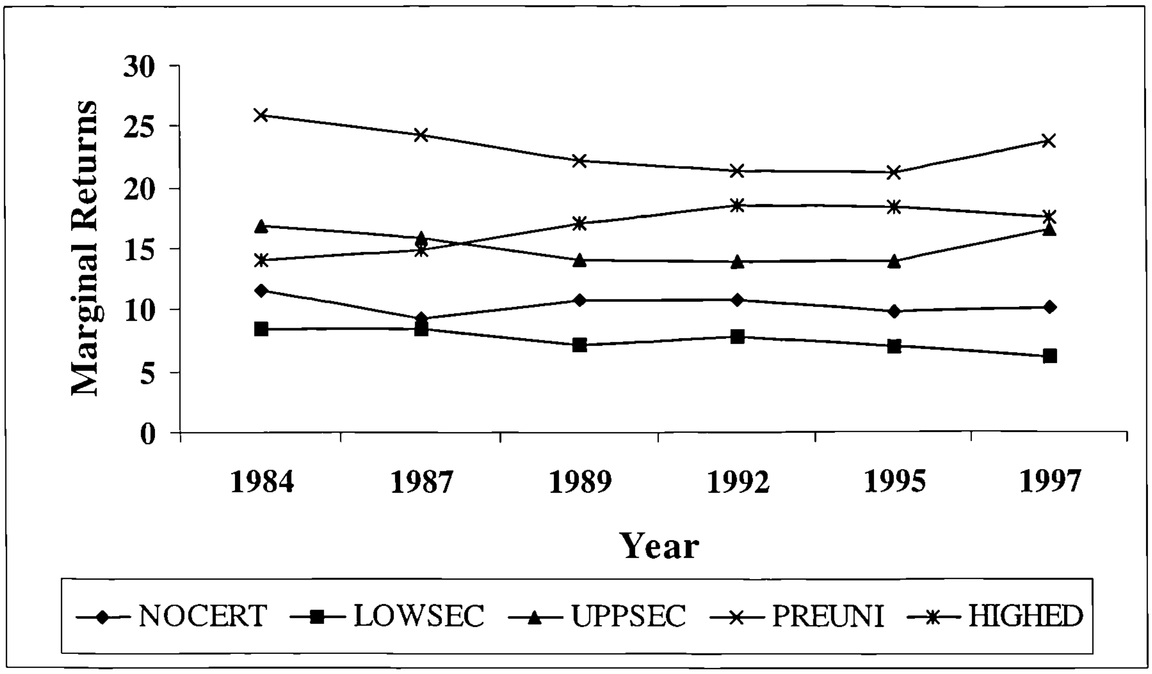
The general overview of the results obtained from regressing equation (7.1) and (7.3) on the data will also be discussed (the full results are in the appendix).

7.3.1 THE MARGINAL GROSS RETURNS TO EDUCATION TREND

7.3.1.1 Overall Sample

The estimates of the earnings function equation show that the effects of all educational levels are statistically significant at the 1 percent level for all the 6 years (Refer to Table 1 in the Appendix). In fact, all variables are highly significant at the 1 percent level.

Graph 7.1: Marginal Gross Returns to Education (Overall Sample)

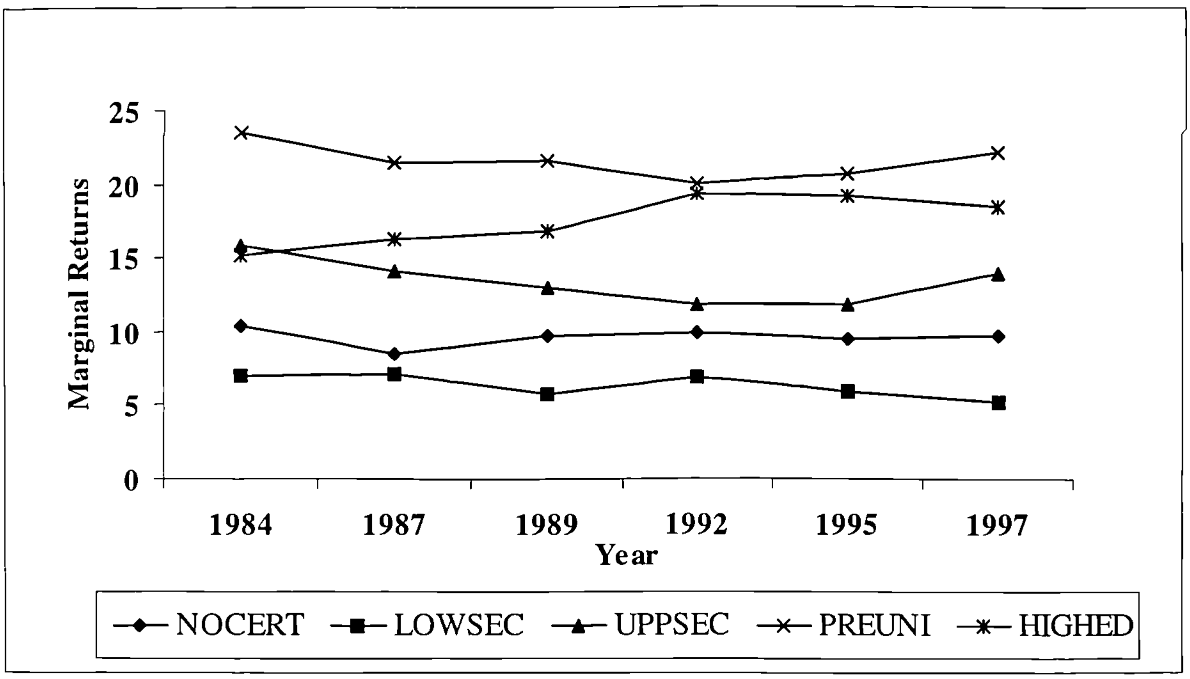


Graph 7.1 shows the marginal gross returns to education for the overall sample. When we analyse the graph at the lower levels of education, i.e. at the NOCERT and LOWSEC levels, the marginal gross returns to education appear stable. The UPPSEC level displays declining marginal gross returns in the 1980s (from 1984 to 1989) and this was followed by a stable level of marginal gross returns in the early years of 1990. Marginal gross returns for the UPPSEC level increased to the 1984 level in 1997. There was a declining trend for the PREUNI level until 1995. The marginal gross returns increased slightly from 1995 (by 3 percentage points) to 1997. At the HIGHED level, marginal gross returns increased in the 1980s and stabilised in the late 1980s till 1997.

7.3.1.2 Male Sample

The average returns to all levels of education were positive for the males and were highly significant at the 1 percent level for every year analysed here (Refer to Table 2 in the Appendix).

Graph 7.2: Marginal Gross Returns to Education (Male Sample)

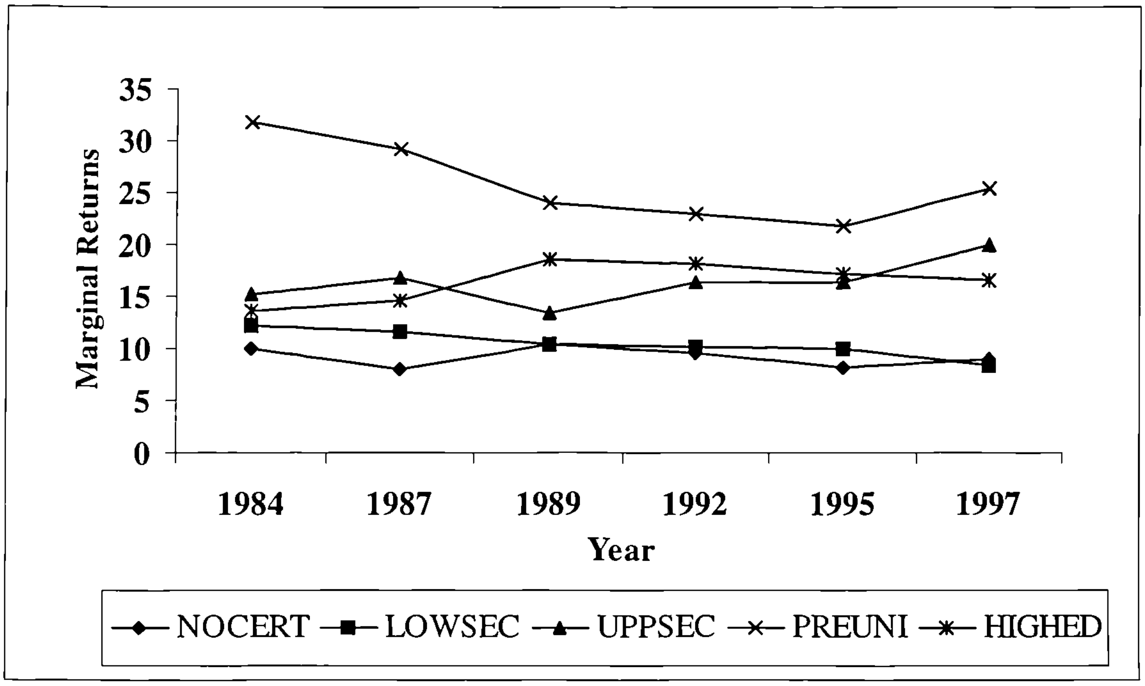


Overall, the marginal gross returns to the different levels of education for the males can be considered to be fairly stable. The year-by-year changes are small (between 1 to 2 percentage points) for all the education levels with the exception of the HIGHED level. At the HIGHED level, in the 1980s, the male sample result indicated increasing marginal gross returns. After 1992, the marginal gross returns begin to decline. Nevertheless, the returns in 1997 are higher than the returns in 1984 (15 percent).

7.3.1.3 Female Sample

Referring to the results in Table 3 in the appendix, the female average returns to education over time are positive for all levels of education. The education variables are also highly significant at the 1 percent level regardless of the level of education.

Graph 7.3: Marginal Gross Returns to Education (Female Sample)



Graphically, the changes in the marginal gross returns over time seem clearer compared to that found in the overall and male samples. For example, at the LOWSEC education level, the graph shows a steady downward sloping line indicating declining marginal gross returns. Similarly, at the UPPSEC education level, a clear increasing marginal gross return is seen (with a dip in 1989).

Graph 7.3 presents the marginal gross returns for the female sample in our analysis. There are also declining marginal gross returns to education for the females from 1984 to 1997 (except at the UPPSEC and the HIGHED education level). We also find that the marginal gross returns for our female sample have large decreases in the year to year changes compared to the stable and small year to year changes obtained for the overall and male samples. At the NOCERT level, the female marginal gross return is fairly stable from 1984 to 1997. A decline of 4 percentage points in the marginal gross returns was calculated for the females at the LOWSEC level while at the PREUNI level, the marginal gross returns declined by 6 percentage points.

To sum this section, we find that the marginal gross returns to the lower levels of education to be lower compared to the marginal gross returns over time to higher levels of education in all of our samples. The marginal gross returns for each level of education for females in Malaysia appear to be higher than those obtained in the male sample (with the exception of returns to the HIGHED level, where the males have slightly higher marginal gross returns).

7.3.2 *THE MARGINAL GROSS RETURNS TO EDUCATION TREND, WITH SELF-SELECTION CORRECTION*

7.3.2.1 The determinants of Female Labour Force Participation

Table 4 in the Appendix displays the results of the determinants of the female labour force participation[180] (which we have calculated using the conventional probit model as presented in section 7.2.1 of this chapter) for the female sample. As noted in the methodology, the purpose of running the determinants of labour force participation is to check on the issue of self-selection on our returns to education estimation. We analyse the determinants of labour force participation, in order to compute the correction term to be inserted into the earnings equation. The second step, i.e. inserting a correction term into the wage equation that we take completes the Heckman procedure[181] that we have discussed and presented in Chapter 3 of this thesis. The Heckman procedure will enable us to gauge the impact and direction of self-selection on the marginal gross returns to education in our female sample.

As discussed in Chapter 3, there is a need to identify at least one restrictive variable, i.e. a variable that determines the labour force participation decision but does not influence

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[180] Labour force participation is measured by the employment status of the women, i.e. those who are employers, employees and unpaid family workers are considered as participants in the labour force.

[181] We tested our data before making this decision to use the Heckman procedure. Our Variance Inflation Factor (VIF) scores were lower (ranging from 11.17 to 11.38) than 30. In Besley, Kuh and Welsch (1980), as quoted in Leung and Yu (1996), a condition number beyond 30 is indicative of collinearity problems. In addition, our objective is to identify if self-selection has occurred in our data and the Two-Part model does not allow us to note this, as it does not include the correction term or the IMR in the second stage of analysis.

earnings in the first stage of the Heckman two-step procedure (See Dearden, 1997; Puhani, 2001 and Leung and Yu 2000). The identifying variable, which we have used in our analysis, is the presence of a child below the age of 15[182] (BELOW15) and older persons above the age of 64 (OVER64). We believe that the wages that a person gets does not depend on the number of dependants that they have. Therefore, we would be able to exclude these variables from the wage equation.

We hypothesise that a woman will be less likely to work with the presence of children below the age of 15 in the household.[183] The second variable, the presence of an elderly person(s) above 64 could work in two ways. A woman could be encouraged to work with the presence of the elderly person(s) as this elderly person(s) could provide the child care while the women is away at work or work in the opposite direction where the woman would opt not to work due to the need to care for the elderly.

The results in general appear to be consistent throughout all the years analysed. We shall present the results according to a general trend that can be seen across the board. We generally find that the majority of the variables investigated are highly significant at the 1 percent significance level (referring to the results for the female sample in Table 4). Looking specifically at the education variables, we find that those with a LOWSEC

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[182] These young persons may not belong to the individual woman in the household, as the child/children could be niece(s), nephew(s) and so on.
[183] This hypothesis is on the context that the woman plays the traditional role of a homemaker.

qualification are less inclined to participate in the labour force compared to the reference category, which comprises those with no formal education. All other levels of education are positive, which allows us to interpret the results as those with a particular education level (other than LOWSEC, namely NOCERT, UPPSEC, PREUNI and HIGHED) are likely to participate in the labour force compared to those with no formal education.

The results show that married women are less likely to participate in the labour force compared to those who are not married. Female urbanites (URBAN) are found to be less likely to participate in the labour force compared to those living in the metropolitan areas as depicted by the negative coefficient found on the URBAN dummy variable in our probit analysis. It appears that those living in the rural areas are more likely to participate in the labour force compared to those living in the metropolitan areas. Our results also indicate that the females living in Peninsular Malaysia are less likely to participate in the labour force compared to those living in East Malaysia (which is our reference category).

Moving on to the results of the two identifying variables noted in the earlier paragraph, our analysis shows that the more *children below the age of 15 that are present in the* respondent's household, the less likely the woman will participate in the labour force. On the other hand, the results indicate that the presence of one or more elderly persons in the household, the more likely the respondent will work or participate in the labour force. This result appears to give support to the first of our two intuitions on the presence of one or more elderly person in the household, i.e. a person is encouraged to work with the presence of an elderly person(s). In such situation, it is typically assumed that the elderly person(s) would be able to provide the childcare while the woman is away at work.

7.3.2.2 The Sample Selection Corrected Marginal Gross Returns to Education for the Female Sample

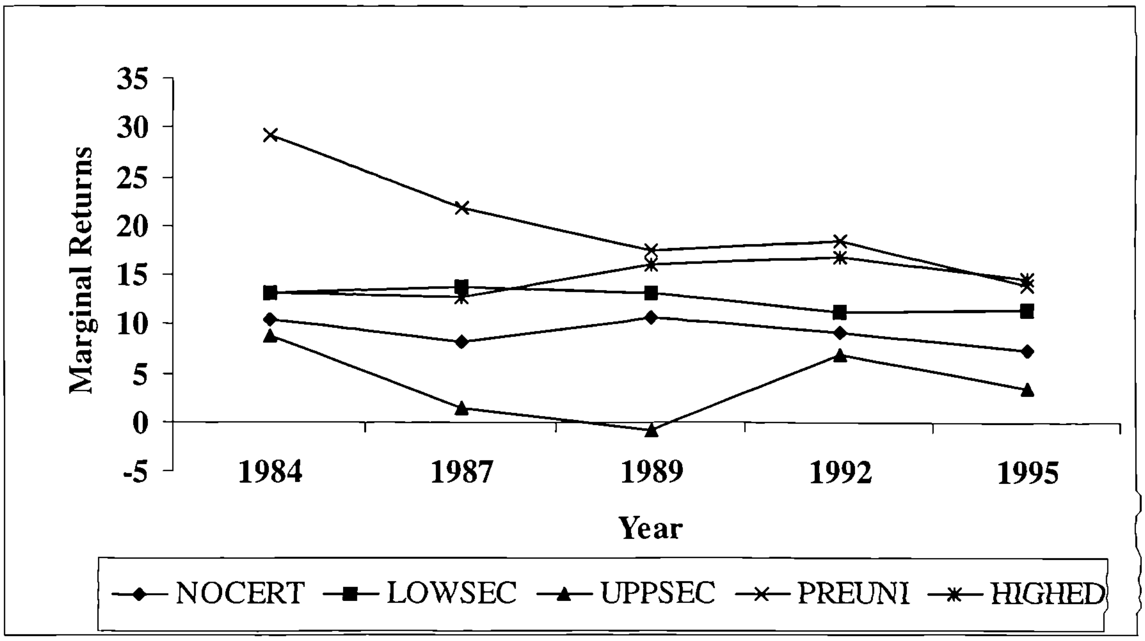
The probit coefficients analysed in the above section, 7.3.2.1 will be used to obtain the self-selection correction term or better known as the Inverse Mills Ratio (IMR) to allow us to proceed onto the second stage of the Heckman procedure. This correction term will be inserted into the earnings function as an independent variable to allow us to gauge the direction of the selection bias on our returns to education estimates. For instance, if we obtain a positive and statistically significant IMR coefficient in the wage equation, selection bias exists (from the significance of the IMR) and such result would suggest that the group of persons analysed who have actually chosen to participate in the labour market earns higher wages then randomly assigned persons (Brunello, et al., 2000). The opposite is true when we have a negative IMR coefficient. It implies that our sample is negatively selected.

The discussion of the marginal gross return with self-selection correction results will be structured as follows - we will firstly attempt to assess if our results indicate the presence of self-selection or not followed by a brief discussion of the IMR term. The discussion will then be continued with the presentation of the general results obtained, followed by a discussion on the marginal gross returns to education trend after considering this self-selection bias issue.

The self-selection corrected earnings function results for the female sample is displayed in Table 5 in the appendix. All variables investigated remain highly significant at the 1 percent level. The IMR term in the earnings function is negative and highly significant throughout all the 5 years that we analyse. The negative IMR term indicates that the sample of women in our analysis is negatively selected. This means that the women who are more likely to participate in the labour force, faces lower wages than observationally identical women who are less likely to participate in the labour force.

Graph 7.4 displays the trend of the sample selection corrected marginal gross returns to each level of education for the female sample.

Graph 7.4: Sample Selection Corrected Marginal Gross Returns to Education (Female Sample)



We find that the marginal gross returns to all levels of education for our female sample have declined. The decline is larger for selected education levels compared to the decline in the results before the self-selection correction procedure. For instance, at the NOCERT level, the marginal gross returns were stable before we corrected for female selection to participating in the labour force. However, after attempting to correct for self-selection, we find a decline in the marginal gross returns for the NOCERT level of education. The returns decline by 3 percentage points from 1984 to 1995.

An instance of a large decline in the marginal gross returns after self-selection correction is found at the UPPSEC level. We find that marginal gross returns to this level of education increased by 5 percentage points before the self-selection correction. However, after the self-selection correction, we see a decline in the marginal gross returns of 5 percentage points. Similarly, at the PREUNI level, the decline is maintained but at a larger magnitude of 15 percentage points compared to the earlier decline of 6 percentage points. The positive result, which is retained after considering self-selection, is the increasing marginal gross returns to the HIGHED level. However, the increase in the returns is reduced from 3 percentage points to 1 percentage point.

7.4 DISCUSSION.

So far, we have presented two sets of results. They are: -

- The marginal gross returns to each level of education for the 3 samples, the overall sample, male and female samples and
- The marginal gross returns to different levels of education after the self-selection correction for the female sample.

Why have we considered self-selection in the female sample? The self-selection issue arises (as explained and discussed in Chapter 3 of this thesis) when the individuals, in our case, the females in the data set that we investigate, select themselves into participating in an event. Sample selection could also occur when the analyst or data processors make the selection decisions. In this thesis, the cause of self-selection that we have applied is that we believe that the individuals in our data set have self-selected themselves into participating in the labour force. Our results indicate that self-selection did occur in our female sample.[184]

Before we proceed with the discussion of the issues involved, we present the table below, which summarises the results that we have obtained. Our dynamic results are based on the marginal gross returns calculated for the period 1984 to 1997. In summarising the results for the female sample, we will also consider the results obtained from the self-selection correction procedure, which covers the period 1984 to 1995.

Summary Table of the Returns to Education in Malaysia Over time, 1984-1997

Education Level	**Overall Sample**	**Male Sample**	**Female Sample**	
			Without SSC	*With SSC*
NOCERT	Stable	Stable	Stable	Declined by 3% points
LOWSEC	Stable	Stable	Declined by 4% points	Stable
UPPSEC	Stable	Stable	Increased by 5% points	Declined by 5% points
PREUNI	Stable	Stable	Declined by 6% points	Declined by 15% points
HIGHED	Increased by 3 % points	Increased by 3% points	Increased by 3% points	Stable

Note: SSC refers to Self-Selection Correction

[184] We conclude this based on the significance of the Inverse Mills Ratio (IMR) found in our regression results.

7.4.1 The phenomenon of higher marginal gross returns to higher levels of education.

Our examination of the returns to education in this chapter and also in the earlier chapters of this thesis shows that there are higher returns to higher levels of education.

In Ryoo, et al.'s (1993) study on the changing rates of returns to education over time for South Korea, the researchers noted that the phenomenon of higher returns to higher levels of education was possible especially during periods of rapid industrialisation and educational expansion. Ryoo, et al. (providing evidence of similar findings in other studies[185]) called for an exception to the generally accepted results of higher private and social returns for primary schooling relative to the higher levels of schooling. The researchers are convinced that due to periods of rapid industrialisation, the pay-off to higher education are better than the pay-off to lower levels of education.

In the Malaysian context, Malaysia began to focus on industrialisation after the reinstating of the administration under the current Prime Minister in 1981. The industrialisation period started with the steel industry and the national car project. In 1986, the first Industrial Master Plan, 1986-1995 was implemented to provide a blueprint for an accelerated industrial development. GDP growth for this period that we are analysing,

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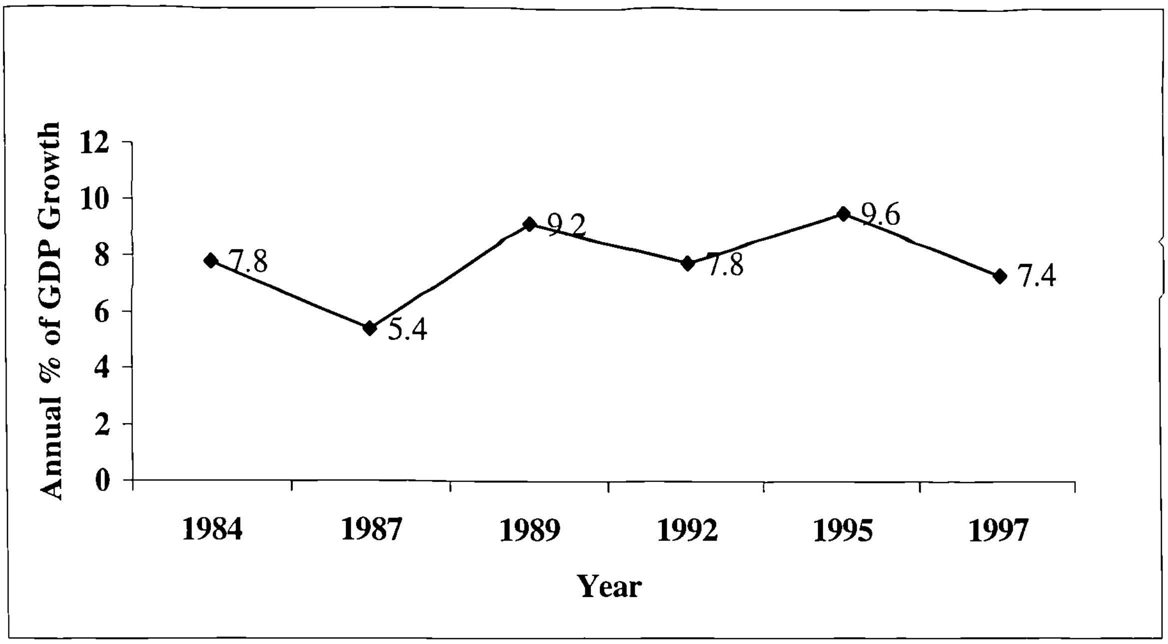
[185] The other studies quoted included Mohan (1986) for Bogota, Chung (1990)'s study on Hong Kong and an older paper by Carnoy and Marenbach (1975) for the USA.

1984 to 1997 was high, as indicated in Graph 7.5 below. The average GDP growth rate for this period 1984 to 1997 was 7.9 percent.

Graph 7.5: Annual GDP Growth (%), 1984-1997



Therefore, the occurrence of higher marginal gross returns to higher levels of education relative to lower levels for education in Malaysia (as observed from the results in this thesis) can be explained and linked to the industrialisation process that occurred in the country. This finding not only gives additional support for the argument that Ryoo, et al. advocates but also confirms the results found in the individual Malaysian rate of returns to education studies presented in Chapter 4. All the studies reviewed (with the exception of Hoerr (1973)) indicate higher marginal gross returns to higher levels of education.

7.4.2 Stability in the Marginal Gross Returns to Education over Time.

When Gindling et al. (1995) found a stable pattern of returns to education in Taiwan over the 1978 to 1991 period, they speculated that relative demand for educated labour must have increased alongside the educational expansion that would have increased the supply of educated labour in Taiwan.

In this section, we will apply a simple demand and supply model used by Katz and Murphy (1992) as an attempt to provide a formal explanation of the trends in the Malaysian returns to education from 1984 to 1997. In this analysis, the 3 main elements in the demand and supply model used in Katz and Murphy's paper are relative wages, relative demand and relative supply of higher educated workers in Malaysia.

When considering relative wages, we are attempting to analyse the determinants of the changes in the relative wages of a group of high skilled individuals with a second group of low-skilled individuals. For this analysis, the high-skilled individuals are those with a tertiary degree, i.e. the HIGHED graduates. Our low-skilled workers are those with the LOWSEC qualification level.[186]

[186] We justify the usage of these two levels of education by arguing that basic education was a minimum of 9 years (until the change in 1997 to extend basic education in Malaysia to 11 years), hence we can consider the LOWSEC education level as a benchmark for low-skilled individuals. On the higher end of the skill level, HIGHED would be an appropriate proxy considering the emphasis of the Government in attempting to increase the number of degree holders in the last decade.

In this demand and supply investigation, we will utilise all the 6 years of data that we have. The data set for each year is firstly divided into 16 cells, i.e. by gender and 8 experience levels. The 8 experience levels cover those with 1–5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35 and 36-40 years of experience.[187] Fixed weights are then calculated for each of the 16 cells by using the cell's average share of total employment over the period of analysis, i.e. 1984 to 1997. These fixed weights are then used to compute the HIGHED/LOWSEC wage premium by taking the ratio of the average annual wages of a HIGHED graduate and LOWSEC qualifier multiplied by the fixed weights.

Graph 7.6 shows the log relative wages of the high skilled to low-skilled individuals in Malaysia for 1984 to 1997. Relative wages appear to have risen from 1984 to 1987 and are stable from 1987 and 1989, only to decline in 1992. It stabilised between 1992 and 1995 and increased in 1997.

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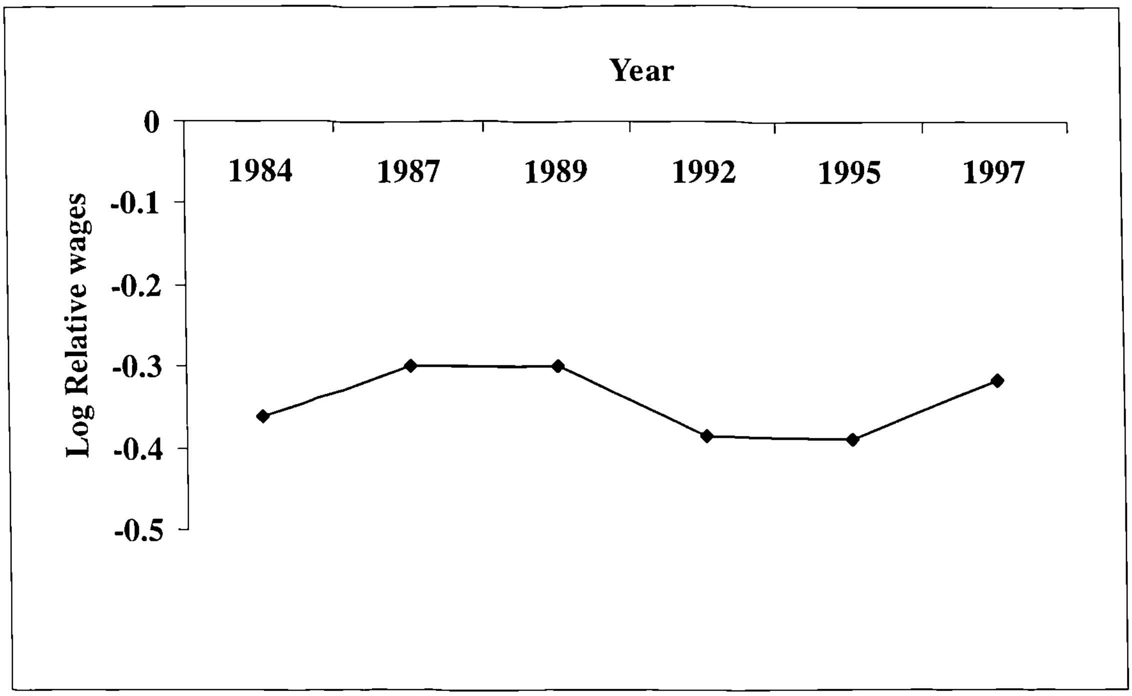
[187] Experience is calculated as (Age-years of schooling-6).

Graph 7.6: Log of Relative Wages, 1984-1997



Katz and Murphy (1992) proposed two explanations to illustrate the changes in the relative wages. The first being that the change in relative wages represents a change in the relative market price of skills possessed by the high-skilled and low-skilled individuals. The second explanation involves the quality of the two groups of individuals by looking at the changes in the composition of the low-skilled and high-skilled individuals. We seek to use the first of the two explanations[188] noted in Katz and Murphy's paper to explain the relative wages trend in Malaysia from 1984 to 1997.

[188] This is because we feel that the issue of labour quality is still a rather subjective area within the Malaysian labour market. In addition, as it could cover an area of different issues altogether, it is not within the scope of this thesis to analyse this issue satisfactorily.

At the end of this analysis, we hope to be able to determine the degree to which the change in the relative wages is driven by fluctuations in the growth of supply verses the growth of demand side factors. In order to do this, we need to estimate the relative supply of the HIGHED and LOWSEC individuals. The relative supply of skilled labour is computed by using the values of the coefficients obtained from 4 regressions.[189] For this analysis, we have a small number of observations (n=6). Hence, to suit the condition of the data that we have, we assume that the lower education group, i.e. the NOFED and NOCERT is a linear combination of the LOWSEC group (meaning that we set HIGHED=0 in the original Katz and Murphy demand and supply model). On the other hand, those with UPPSEC and PREUNI qualification are a linear combination of the HIGHED group (setting LOWSEC=0).[190] The 'value' of a person with a particular qualification is measured by the individual educational group's average wages (hence we have used the notation WNOCERT, WNOFED, WLOWSEC, WUPPSEC, WPREUNI and WHIGHED to indicate this). The table below shows the results obtained from the 4 regressions.

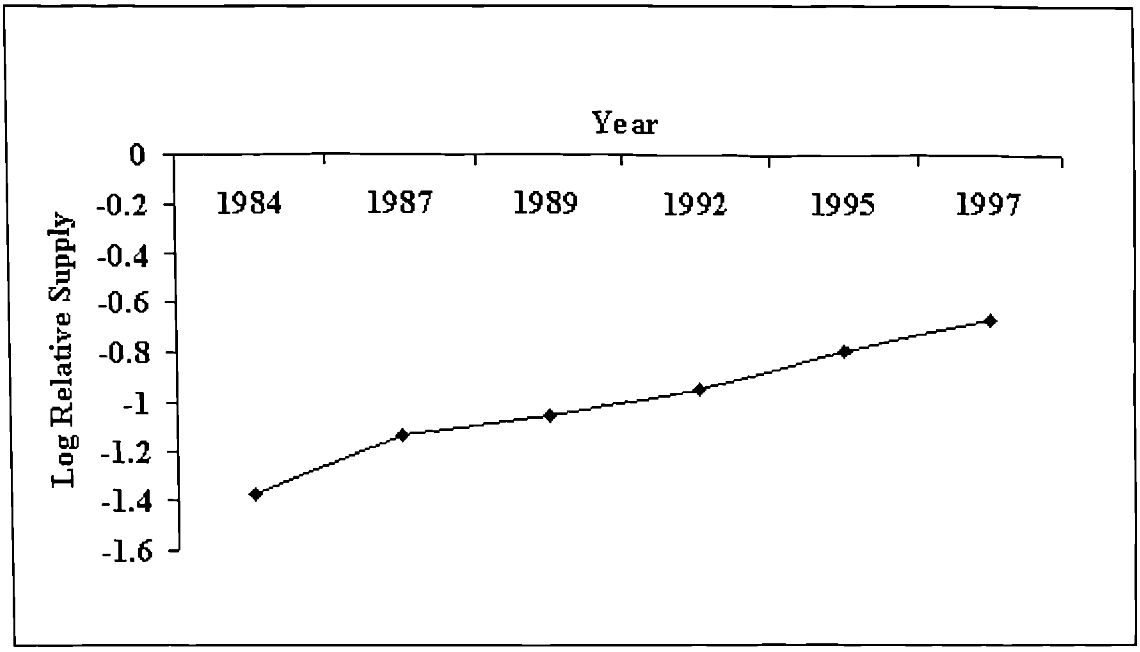
[189] These regressions do not contain an intercept term and have White corrected Standard errors.
[190] In the Katz and Murphy paper, the regressions for this part of the model were based on the assumption that each group of individuals measured by their average wages, is a linear combination of the HIGHED and LOWSEC individuals. However, the results that we obtained were rather peculiar, which motivated this modification to the calculation of the relative supply. We suspect that the peculiar results obtained using the original Katz and Murphy assumption is caused by the small number of observation that we have.

Table 7.1: Regression Results leading to the Calculation of Relative Supply

INDEPENDENT VARIABLES	WLOWSEC	WUNIV
WNOFED	0.420	0
WNOCERT	0.962	0
WUPPSEC	0	0.221
WPREUNI	0	0.382

We interpret the results presented in Table 7.1 as a person with NOFED is equivalent to a total of 0.42 of a LOWSEC person and a NOCERT person is 0.962 of a LOWSEC person. At the other end, a person with an UPPSEC qualification is 0.221 of a HIGHED person and a person with a PREUNI qualification is 0.382 of a person with a HIGHED qualification. These coefficients are used to form the supplies of HIGHED and LOWSEC equivalents. Graph 7.7 shows the log of relative supply computed for the time period of 1984 to 1997.

Graph 7.7: Log Relative Supply of skilled Labour, 1984-1997



Relative supply has increased over the time period of our analysis as depicted in Graph 7.7. There does not appear to be any obvious fluctuation in the relative supply. At this point, it does not give us the impression that supply itself is enough to explain the changes in the HIGHED wage premium.

Moving on to measure the relative demand of HIGHED graduates, we use the relationship between the log of relative wages, demand and the log of relative supply. Katz and Murphy's relative demand model (which we have modified with some of our own notations) is as follows: -

$$\log RW = \frac{1}{\sigma}[D(t) - \log RS] \qquad (7.4)$$

where log RW is the log of relative wages

σ is the elasticity of substitution between HIGHED and LOWSEC qualifiers

D(t) is the relative demand and

Log RS is the log of relative supply.

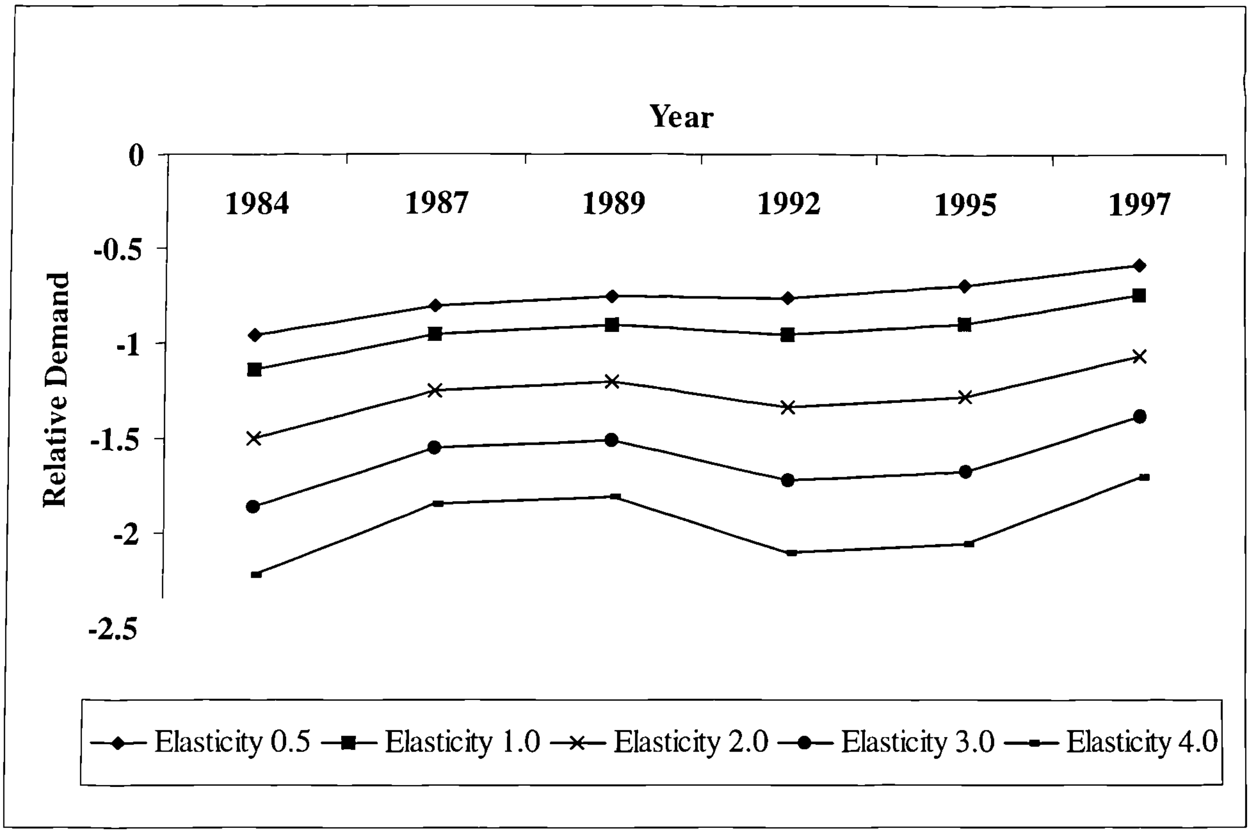
Rearranging equation (7.4), relative demand can be calculated using the following equation: -

$$D(t) = \sigma \log RW + \log RS \qquad (7.5)$$

We substitute σ with various elasticities of substitution to measure relative demand. We use σ ranging from 0.5 to 4. Graph 7.8 shows the measured log of relative demand with the different elasticities of substitution.

Looking across the board, there is an upward trend in the log of relative demand of the HIGHED graduates. However, at the lower levels of σ, the upward slope of the relative demand curve is markedly clearer (when σ is from 0.5 to 2) compared to the log of relative demand with higher elasticity of substitution (when σ is equal to 2.0 and above).

Graph 7.8: Relative Demand, 1984-1997



From this analysis, we are drawn to note that relative demand for the HIGHED workers have been increasing amidst increasing relative supply from 1984 to 1997. This seems plausible considering that relative wages in Malaysia have increased slightly from 1984 to 1997 (recall from Graph 7.6).

7.5 CONCLUSION

This chapter examines the changes in the returns (or the marginal gross returns) over the period 1984 to 1997 using a series of nationally collected data sets for Malaysia. We find that the Malaysian returns to education have been fairly stable for all education levels (with the exception of the HIGHED level) for both the overall and male samples from 1984 to 1997. At the HIGHED level, an increasing trend is evident. In the female sample analysis, a mixture of patterns is obtained. The returns for the NOCERT level among the females is stable while at the LOWSEC and PREUNI education levels, the returns have been declining. At the UPPSEC and HIGHED levels, the returns to education for our female sample are found to be increasing.

We have also investigated the issue of sample selection in our female sample and the results indicate that our sample was negatively selected from the significant IMR obtained through the 2-step Heckman model. After considering this sample selection bias, we find that the returns to education for our female sample display a declining trend at all levels of education (with the exception of the LOWSEC and HIGHED level, which we find to be stable).

For all samples, higher returns are obtained for the higher education levels.[191] Such results confirm the pattern of higher returns to higher levels of education as obtained in previous Malaysian studies on the returns to education. These result places Malaysia along with other countries found to have returns to education, which diverts away from conventional findings of higher returns to lower levels of education. However, we are able to justify the Malaysian phenomenon of higher marginal gross returns to higher levels of education. This phenomenon is possible based on the rapid industrialisation that occurred in Malaysia during the time period of our analysis.

We also have applied a simple demand and supply model (as used by Katz and Murphy, 1992) to our data in order to provide a formal explanation of the returns to education pattern in Malaysia. This demand and supply analysis allows us to have an overall look at the demand and supply of educated workers in Malaysia. This integrated analysis have produced results, which appear to indicate that demand side forces were present, working along the supply side factors in determining the pattern of wage changes. We deduce that demand must have increased alongside rising supply of higher educated workers in order

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[191] Within the higher educational level category, the PREUNI level has higher returns compared to the HIGHED educational level.

for the relative wages of the highly skilled workers to increase slightly from 1984 to 1997. This result conforms to the patterns of the returns to education (especially in explaining the increasing returns to the HIGHED education level) over time in Malaysia for the period 1984 to 1997.

The plausibility of our demand and supply framework result is enhanced by the rapid industrialisation stage that Malaysia embarked into during the late 1980s. In the next chapter, we will amalgamate the results of this chapter together with those obtained in Chapters 5 and 6 to look into the implication of the results obtained in this thesis.

APPENDIX

Table (i): Descriptive statistics – Overall sample, Age 15-64

Household Income Survey 1984

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
SEX	146113	1.507	0.500	1	2
AGE	146113	32.186	12.787	15	64
AGE^2	146113	1199.456	942.779	225	4096
MARITAL	146109	1.691	0.591	1	4
CITIZEN	145519	1.116	0.592	1	6
CERTOBT	145961	6.732	3.092	1	9
LNHOUR	84029	3.760	0.404	0	5.124
NOFED	145961	0.154	0.361	0	1
NOCERT	145961	0.524	0.499	0	1
LOWSEC	145961	0.138	0.345	0	1
UPPSEC	145961	0.137	0.343	0	1
PREUNI	145961	0.031	0.173	0	1
HIGHED	145961	0.017	0.128	0	1
GROSSE per annum (Malaysian Ringgit)	146027	4481.884	10373.07	0	1016400
LNGROSS	84796	8.451	1.071	0	13.832
MALE	146113	0.493	0.500	0	1
MARRY	146109	0.589	0.492	0	1
PM	146113	0.789	0.408	0	1
MSIAN	145519	0.958	0.200	0	1
EMPLOYER	146113	0.126	0.332	0	1
EMPLOYEE	146113	0.430	0.495	0	1
UNPAID	146113	0.054	0.227	0	1
METRO	146113	0.347	0.476	0	1
URBAN	146113	0.239	0.427	0	1
RURAL	146113	0.413	0.492	0	1

Table (ii): Descriptive statistics – Male sample, Age 15-64

Household Income Survey 1984

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	72045	32.298	12.752	15	64
AGE^2	72045	1205.777	939.141	225	4096
MARITAL	72043	1.612	0.542	1	4
CITIZEN	71765	1.136	0.635	1	6
CERTOBT	71968	6.582	3.200	1	9
LNHOUR	55070	3.797	0.364	0	5.124
NOFED	71968	0.084	0.278	0	1
NOCERT	71968	0.557	0.497	0	1
LOWSEC	71968	0.152	0.359	0	1
UPPSEC	71968	0.147	0.354	0	1
PREUNI	71968	0.035	0.184	0	1
HIGHED	71968	0.025	0.155	0	1
GROSSE per annum (Malaysian Ringgit)	71974	7194.097	13637.99	0	1016400
LNGROSS	58113	8.661	0.948	0	13.832
MARRY	72043	0.575	0.494	0	1
PM	72045	0.781	0.414	0	1
MSIAN	71765	0.951	0.216	0	1
EMPLOYER	72045	0.193	0.395	0	1
EMPLOYEE	72045	0.594	0.491	0	1
UNPAID	72045	0.031	0.174	0	1
METRO	72045	0.344	0.475	0	1
URBAN	72045	0.242	0.428	0	1
RURAL	72045	0.413	0.492	0	1

Table (iii): Descriptive statistics – Female sample, Age 15-64

Household Income Survey 1984

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	74068	32.077	12.820	15	64
AGE^2	74068	1193.308	946.2692	225	4096
MARITAL	74066	1.768	0.626	1	4
CITIZEN	73754	1.097	0.546	1	6
CERTOBT	73993	6.878	2.977	1	9
LNHOUR	28959	3.689	0.461	0	5.124
NOFED	73993	0.221	0.415	0	1
NOCERT	73993	0.492	0.500	0	1
LOWSEC	73993	0.125	0.330	0	1
UPPSEC	73993	0.126	0.332	0	1
PREUNI	73993	0.027	0.161	0	1
HIGHED	73993	0.009	0.094	0	1
GROSSE per annum (Malaysian Ringgit)	74053	1769.670	4042.686	0	166048
LNGROSS	26683	7.991	1.175	0	12.020
MARRY	74066	0.603	0.489	0	1
PM	74068	0.797	0.402	0	1
MSIAN	73754	0.966	0.182	0	1
EMPLOYER	74068	0.062	0.241	0	1
EMPLOYEE	74068	0.270	0.444	0	1
UNPAID	74068	0.077	0.266	0	1
METRO	74068	0.350	0.477	0	1
URBAN	74068	0.237	0.425	0	1
RURAL	74068	0.413	0.492	0	1
BELOW 15	74060	2.115	1.870	0	17
OVER64	74060	0.178	0.437	0	5

Table (iv): Descriptive statistics – Overall sample, Age 15-64
Household Income Survey 1987

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
SEX	160452	1.504	0.500	1	2
AGE	160452	32.531	12.788	15	64
AGE^2	160452	1221.818	946.128	225	4096
MARITAL	160452	1.690	0.593	1	4
CITIZEN	159639	1.118	0.586	1	6
CERTOBT	160297	6.655	3.093	1	9
LNHOUR	92584	3.757	0.419	0	5.124
NOFED	160297	0.132	0.339	0	1
NOCERT	160297	0.523	0.499	0	1
LOWSEC	160297	0.130	0.336	0	1
UPPSEC	160297	0.155	0.362	0	1
PREUNI	160297	0.040	0.196	0	1
HIGHED	160297	0.019	0.138	0	1
GROSSE per annum (Malaysian Ringgit)	160452	4207.237	8542.225	0	968863
LNGROSS	91619	8.428	1.080	1.099	13.784
MALE	160452	0.496	0.500	0	1
MARRY	160452	0.588	0.492	0	1
PM	160452	0.775	0.417	0	1
MSIAN	159638	0.957	0.203	0	1
EMPLOYER	160452	0.135	0.341	0	1
EMPLOYEE	160452	0.401	0.490	0	1
UNPAID	160452	0.065	0.246	0	1
METRO	160452	0.324	0.468	0	1
URBAN	160452	0.231	0.421	0	1
RURAL	160452	0.446	0.497	0	1

Table (v): Descriptive statistics – Male sample, Age 15-64

Household Income Survey 1987

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	79516	32.568	12.738	15	64
AGE^2	79516	1222.935	940.1625	225	4096
MARITAL	79516	1.607	0.538	1	4
CITIZEN	79140	1.128	0.608	1	6
CERTOBT	79433	6.543	3.183	1	9
LNHOUR	59970	3.792	0.383	0	5.124
NOFED	79433	0.069	0.254	0	1
NOCERT	79433	0.556	0.497	0	1
LOWSEC	79433	0.143	0.350	0	1
UPPSEC	79433	0.161	0.367	0	1
PREUNI	79433	0.044	0.205	0	1
HIGHED	79433	0.027	0.163	0	1
GROSSE per annum (Malaysian Ringgit)	79516	6597.289	10858.72	0	968863
LNGROSS	62325	8.615	0.974	1.609	13.784
MARRY	79516	0.573	0.495	0	1
PM	79516	0.769	0.421	0	1
MSIAN	79140	0.953	0.212	0	1
EMPLOYER	79516	0.206	0.404	0	1
EMPLOYEE	79516	0.545	0.498	0	1
UNPAID	79516	0.042	0.201	0	1
METRO	79516	0.319	0.466	0	1
URBAN	79516	0.233	0.423	0	1
RURAL	79516	0.448	0.497	0	1

Table (vi): Descriptive statistics – Female sample, Age 15-64
Household Income Survey 1987

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	80936	32.495	12.837	15	64
AGE^2	80936	1220.721	951.9561	225	4096
MARITAL	80936	1.771	0.631	1	4
CITIZEN	80498	1.108	0.563	1	6
CERTOBT	80864	6.766	2.997	1	9
LNHOUR	32614	3.693	0.472	0	5.124
NOFED	80864	0.195	0.396	0	1
NOCERT	80864	0.490	0.500	0	1
LOWSEC	80864	0.117	0.322	0	1
UPPSEC	80864	0.151	0.358	0	1
PREUNI	80864	0.036	0.186	0	1
HIGHED	80864	0.012	0.108	0	1
GROSSE per annum (Malaysian Ringgit)	80964	1859.088	4205.962	0	204000
LNGROSS	29294	8.031	1.184	1.099	12.226
MARRY	80936	0.603	0.489	0	1
PM	80936	0.781	0.413	0	1
MSIAN	80498	0.961	0.194	0	1
EMPLOYER	80936	0.065	0.246	0	1
EMPLOYEE	80936	0.260	0.439	0	1
UNPAID	80936	0.087	0.281	0	1
METRO	80936	0.328	0.470	0	1
URBAN	80936	0.229	0.420	0	1
RURAL	80936	0.443	0.497	0	1
BELOW15	80946	2.336	2.094	0	18
OVER64	80946	0.203	0.476	0	4

Table (vii): Descriptive statistics – Overall sample, Age 15-64

Household Income Survey 1989

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
SEX	163011	1.508	0.500	1	2
AGE	163011	32.919	12.770	15	64
AGE^2	163011	1246.741	943.5089	225	4096
MARITAL	163008	1.695	0.583	1	4
CITIZEN	162296	1.103	0.540	1	6
CERTOBT	162923	6.588	3.097	1	9
LNHOUR	95626	3.773	0.379	0	5.124
NOFED	162923	0.125	0.331	0	1
NOCERT	162923	0.515	0.500	0	1
LOWSEC	162923	0.125	0.331	0	1
UPPSEC	162923	0.172	0.377	0	1
PREUNI	162923	0.043	0.204	0	1
HIGHED	162923	0.019	0.137	0	1
GROSSE per annum (Malaysian Ringgit)	163011	4554.04	8808.317	0	600000
LNGROSS	93608	8.518	1.049	1.609	13.305
MALE	163011	0.492	0.500	0	1
MARRY	163008	0.599	0.490	0	1
PM	163011	0.765	0.423	0	1
MSIAN	162296	0.961	0.193	0	1
EMPLOYER	163011	0.135	0.342	0	1
EMPLOYEE	163011	0.402	0.490	0	1
UNPAID	163011	0.062	0.241	0	1
METRO	163011	0.325	0.469	0	1
URBAN	163011	0.214	0.410	0	1
RURAL	163011	0.461	0.498	0	1

Table (viii): Descriptive statistics – Male sample, Age 15-64

Household Income Survey 1989

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	80149	33.054	12.793	15	64
AGE^2	80149	1256.204	944.6313	225	4096
MARITAL	80149	1.620	0.534	1	4
CITIZEN	79788	1.111	0.556	1	6
CERTOBT	80102	6.485	3.171	1	9
LNHOUR	61774	3.803	0.347	0	5.124
NOFED	80102	0.069	0.254	0	1
NOCERT	80102	0.543	0.498	0	1
LOWSEC	80102	0.135	0.342	0	1
UPPSEC	80102	0.178	0.383	0	1
PREUNI	80102	0.048	0.214	0	1
HIGHED	80102	0.026	0.159	0	1
GROSSE per annum (Malaysian Ringgit)	80149	7181.464	11106.52	0	600000
LNGROSS	63498	8.708	0.940	1.609	13.305
MARRY	80149	0.597	0.492	0	1
PM	80149	0.760	0.427	0	1
MSIAN	79788	0.958	0.201	0	1
EMPLOYER	80149	0.213	0.409	0	1
EMPLOYEE	80149	0.546	0.498	0	1
UNPAID	80149	0.040	0.195	0	1
METRO	80149	0.321	0.467	0	1
URBAN	80149	0.213	0.409	0	1
RURAL	80149	0.467	0.499	0	1

Table (ix): Descriptive statistics – Female sample, Age 15-64

Household Income Survey 1989

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	82862	32.789	12.747	15	64
AGE^2	82862	1237.587	942.337	225	4096
MARITAL	82859	1.768	0.618	1	4
CITIZEN	82501	1.096	0.524	1	6
CERTOBT	82822	6.688	3.020	1	9
LNHOUR	33851	3.718	0.426	0	5.124
NOFED	82821	0.179	0.383	0	1
NOCERT	82821	0.488	0.500	0	1
LOWSEC	82821	0.116	0.320	0	1
UPPSEC	82821	0.165	0.372	0	1
PREUNI	82821	0.039	0.194	0	1
HIGHED	82821	0.013	0.112	0	1
GROSSE per annum (Malaysian Ringgit)	82862	2013.301	4492.566	0	123960
LNGROSS	30110	8.118	1.151	1.609	11.728
MARRY	82859	0.611	0.487	0	1
PM	82862	0.770	0.421	0	1
MSIAN	82508	0.965	0.185	0	1
EMPLOYER	82862	0.061	0.239	0	1
EMPLOYEE	82862	0.261	0.439	0	1
UNPAID	82862	0.084	0.277	0	1
METRO	82862	0.330	0.470	0	1
URBAN	82862	0.215	0.411	0	1
RURAL	82862	0.455	0.498	0	1
BELOW15	88674	1.963	1.872	0	13
OVER64	88674	0.151	0.372	0	4

Table (x): Descriptive statistics – Overall sample, Age 15-64

Household Income Survey 1992

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
SEX	156555	1.503	0.500	1	2
AGE	156555	33.241	12.807	15	64
AGE^2	156555	1269.015	949.833	225	4096
MARITAL	156457	1.703	0.582	1	4
CITIZEN	156249	1.131	0.611	1	6
CERTOBT	156549	6.159	3.226	1	9
LNHOUR	94114	3.809	0.352	0	5.124
NOFED	156549	0.115	0.320	0	1
NOCERT	156549	0.460	0.498	0	1
LOWSEC	156549	0.157	0.364	0	1
UPPSEC	156549	0.194	0.396	0	1
PREUNI	156549	0.052	0.222	0	1
HIGHED	156549	0.022	0.146	0	1
GROSSE per annum (Malaysian Ringgit)	156555	5847.556	11486.57	0	816000
LNGROSS	93845	8.739	1.019	0.693	13.612
MALE	156555	0.497	0.500	0	1
MARRY	156457	0.606	0.489	0	1
PM	156575	0.768	0.422	0	1
MSIAN	156255	0.950	0.217	0	1
EMPLOYER	156555	0.131	0.338	0	1
EMPLOYEE	156555	0.442	0.497	0	1
UNPAID	156555	0.047	0.211	0	1
METRO	156555	0.421	0.494	0	1
URBAN	156555	0.186	0.389	0	1
RURAL	156555	0.393	0.488	0	1

Table (xi): Descriptive statistics – Male sample, Age 15-64

Household Income Survey 1992

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	77800	33.423	12.827	15	64
AGE^2	77800	1281.638	951.339	225	4096
MARITAL	77743	1.630	0.540	1	4
CITIZEN	77636	1.150	0.657	1	6
CERTOBT	77799	6.062	3.272	1	9
LNHOUR	60993	3.840	0.319	0	5.124
NOFED	77799	0.069	0.253	0	1
NOCERT	77799	0.401	0.500	0	1
LOWSEC	77799	0.165	0.371	0	1
UPPSEC	77799	0.202	0.401	0	1
PREUNI	77799	0.055	0.228	0	1
HIGHED	77799	0.029	0.167	0	1
GROSSE per annum (Malaysian Ringgit)	77800	9030.352	14429.47	0	816000
LNGROSS	63330	8.913	0.918	1.609	13.612
MARRY	77743	0.591	0.492	0	1
PM	77800	0.763	0.425	0	1
MSIAN	77636	0.943	0.231	0	1
EMPLOYER	77800	0.202	0.402	0	1
EMPLOYEE	77800	0.589	0.492	0	1
UNPAID	77800	0.028	0.164	0	1
METRO	77800	0.420	0.494	0	1
URBAN	77800	0.186	0.389	0	1
RURAL	77800	0.395	0.489	0	1

Table (xii): Descriptive statistics – Female sample, Age 15-64

Household Income Survey 1992

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	78755	33.061	12.786	15	64
AGE^2	78755	1256.542	948.1843	225	4096
MARITAL	78714	1.774	0.613	1	4
CITIZEN	78623	1.112	0.561	1	6
CERTOBT	78750	6.255	3.176	1	9
LNHOUR	33121	3.751	0.399	0.693	5.124
NOFED	78750	0.162	0.368	0	1
NOCERT	78750	0.439	0.496	0	1
LOWSEC	78750	0.149	0.356	0	1
UPPSEC	78750	0.187	0.390	0	1
PREUNI	78750	0.049	0.215	0	1
HIGHED	78750	0.015	0.120	0	1
GROSSE per annum (Malaysian Ringgit)	78755	2703.356	6058.536	0	360000
LNGROSS	30515	8.378	1.117	0.693	12.794
MARRY	78714	0.621	0.485	0	1
PM	78755	0.772	0.419	0	1
MSIAN	78623	0.957	0.202	0	1
EMPLOYER	78755	0.061	0.240	0	1
EMPLOYEE	78755	0.297	0.457	0	1
UNPAID	78755	0.066	0.248	0	1
METRO	78755	0.422	0.494	0	1
URBAN	78755	0.187	0.390	0	1
RURAL	78755	0.392	0.488	0	1
BELOW15	75973	1.933	1.749	0	14
OVER64	75973	0.107	0.354	0	3

Table (xiii): Descriptive statistics – Overall Sample, Age 15-64

Household Income Survey 1995

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
SEX	106200	1.502	0.500	1	2
AGE	106200	33.652	12.829	15	64
AGE^2	106200	1297.012	952.806	225	4096
MARITAL	106190	1.702	0.566	1	4
CITIZEN	106102	1.126	0.616	1	6
CERTOBT	106126	5.759	3.262	1	9
LNHOUR	62099	3.815	0.333	0	5.124
NOFED	106126	0.100	0.299	0	1
NOCERT	106126	0.409	0.492	0	1
LOWSEC	106126	0.173	0.379	0	1
UPPSEC	106126	0.235	0.424	0	1
PREUNI	106126	0.0596	0.237	0	1
HIGHED	106126	0.024	0.152	0	1
GROSSE per annum (Malaysian Ringgit)	106200	7439.693	14713	0	1000000
LNGROSS	63192	9.003	1.009	0	13.816
MALE	106200	0.498	0.500	0	1
MARRY	106190	0.614	0.487	0	1
PM	106200	0.782	0.413	0	1
MSIAN	106102	0.954	0.210	0	1
EMPLOYER	106200	0.124	0.329	0	1
EMPLOYEE	106200	0.450	0.497	0	1
UNPAID	106200	0.037	0.188	0	1
METRO	106200	0.435	0.496	0	1
RURAL	106200	0.372	0.483	0	1
URBAN	106200	0.193	0.395	0	1

Table (xiv): Descriptive statistics – Male Sample, Age 15-64

Household Income Survey 1995

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	52845	33.753	12.862	15	64
AGE^2	52845	1304.686	954.3054	225	4096
MARITAL	52840	1.630	0.528	1	4
CITIZEN	52803	1.151	0.695	1	6
CERTOBT	52776	5.655	3.294	1	9
LNHOUR	40966	3.840	0.304	0	5.124
NOFED	52776	0.060	0.238	0	1
NOCERT	52776	0.423	0.494	0	1
LOWSEC	52776	0.183	0.386	0	1
UPPSEC	52776	0.241	0.427	0	1
PREUNI	52776	0.063	0.242	0	1
HIGHED	52776	0.031	0.174	0	1
GROSSE per annum (Malaysian Ringgit)	52845	11416.940	18398.840	0	1000000
LNGROSS	42794	9.160	0.921	0	13.816
MARRY	52840	0.596	0.491	0	1
PM	52845	0.781	0.414	0	1
MSIAN	52803	0.947	0.224	0	1
EMPLOYER	52845	0.191	0.394	0	1
EMPLOYEE	52845	0.600	0.490	0	1
UNPAID	52845	0.022	0.147	0	1
METRO	52845	0.435	0.496	0	1
RURAL	52845	0.372	0.483	0	1
URBAN	52845	0.194	0.395	0	1

Table (xv): Descriptive statistics – Female Sample, Age 15-64
Household Income Survey 1995

Variable	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	53355	33.551	12.796	15	64
AGE^2	53355	1289.412	951.267	225	4096
MARITAL	53350	1.773	0.593	1	4
CITIZEN	53299	1.101	0.525	1	6
CERTOBT	53350	5.863	3.229	1	9
LNHOUR	21133	3.766	0.378	0	5.124
NOFED	53350	0.139	0.346	0	1
NOCERT	53350	0.395	0.489	0	1
LOWSEC	53350	0.164	0.371	0	1
UPPSEC	53350	0.229	0.420	0	1
PREUNI	53350	0.057	0.231	0	1
HIGHED	53350	0.0162	0.127	0	1
GROSSE per annum (Malaysian Ringgit)	53355	3500.465	8025.752	0	537600
LNGROSS	20398	8.672	1.101	2.303	13.195
MARRY	53350	0.631	0.482	0	1
PM	53355	0.784	0.411	0	1
MSIAN	53299	0.960	0.195	0	1
EMPLOYER	53355	0.056	0.231	0	1
EMPLOYEE	53355	0.301	0.459	0	1
UNPAID	53355	0.051	0.221	0	1
METRO	53355	0.434	0.496	0	1
RURAL	53355	0.372	0.483	0	1
URBAN	53355	0.193	0.395	0	1
BELOW15	53355	1.893	1.768	0	15
OVER64	53355	0.173	0.437	0	4

Table 1: Human Capital Earnings Function, Age 15 – 64 Sample, 1984 - 1997

Variables	1984	1987	1989	1992	1995	1997
Constant	3.497*** (0.048)	2.931*** (0.046)	2.857*** (0.046)	3.401*** (0.046)	4.200*** (0.057)	3.869*** (0.057)
AGE	0.114*** (0.002)	0.126*** (0.002)	0.132*** (0.002)	0.104*** (0.002)	0.098*** (0.002)	0.102*** (0.002)
AGE^2	-0.001*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
NOCERT	0.491*** (0.011)	0.395*** (0.010)	0.464*** (0.010)	0.456*** (0.010)	0.419*** (0.013)	0.432*** (0.014)
LOWSEC	0.851*** (0.013)	0.755*** (0.013)	0.773*** (0.013)	0.791*** (0.012)	0.722*** (0.015)	0.699*** (0.016)
UPPSEC	1.161*** (0.012)	1.051*** (0.012)	1.034*** (0.011)	1.052*** (0.011)	0.982*** (0.014)	1.006*** (0.015)
PREUNI	1.620*** (0.016)	1.484*** (0.015)	1.434*** (0.014)	1.439*** (0.014)	1.364*** (0.017)	1.435*** (0.017)
HIGHED	2.143*** (0.020)	2.039*** (0.017)	2.061*** (0.017)	2.115*** (0.017)	2.034*** (0.020)	2.073*** (0.020)
MARRY	0.142*** (0.007)	0.156*** (0.007)	0.164*** (0.007)	0.103*** (0.006)	0.070*** (0.008)	0.040*** (0.007)
LNHOUR	0.489*** (0.009)	0.580*** (0.009)	0.569*** (0.009)	0.611*** (0.010)	0.511*** (0.012)	0.615*** (0.012)
MALE	0.447*** (0.007)	0.394*** (0.006)	0.401*** (0.006)	0.375*** (0.006)	0.370*** (0.007)	0.400*** (0.007)
R^2	0.39	0.41	0.41	0.41	0.38	0.40
Sample Size	75,643	82,026	85,516	86,506	57,986	59,134

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

Table 2: Human Capital Earnings Function, Age 15 – 64 Male Sample, 1984 - 1997

Variables	1984	1987	1989	1992	1995	1997
Constant	4.090*** (0.057)	3.498*** (0.055)	3.417*** (0.054)	3.902*** (0.055)	4.659*** (0.066)	4.221*** (0.070)
AGE	0.122*** (0.002)	0.134*** (0.002)	0.139*** (0.002)	0.114*** (0.002)	0.106*** (0.002)	0.110*** (0.002)
AGE^2	-0.001*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
NOCERT	0.446*** (0.013)	0.364*** (0.012)	0.423*** (0.012)	0.425*** (0.013)	0.406*** (0.016)	0.414*** (0.017)
LOWSEC	0.747*** (0.016)	0.674*** (0.015)	0.677*** (0.015)	0.719*** (0.014)	0.661*** (0.018)	0.642*** (0.019)
UPPSEC	1.042*** (0.015)	0.939*** (0.014)	0.921*** (0.014)	0.944*** (0.014)	0.884*** (0.017)	0.906*** (0.018)
PREUNI	1.464*** (0.020)	1.326*** (0.019)	1.312*** (0.018)	1.307*** (0.017)	1.258*** (0.021)	1.310*** (0.021)
HIGHED	2.031*** (0.023)	1.929*** (0.020)	1.930*** (0.021)	2.015*** (0.021)	1.959*** (0.025)	1.981*** (0.025)
MARRY	0.223*** (0.009)	0.239*** (0.008)	0.249*** (0.008)	0.180*** (0.008)	0.125*** (0.010)	0.111*** (0.010)
LNHOUR	0.417*** (0.011)	0.500*** (0.010)	0.497*** (0.011)	0.538*** (0.011)	0.453*** (0.014)	0.590*** (0.014)
R^2	0.35	0.39	0.40	0.38	0.35	0.38
Sample Size	52,575	56,541	58,669	58,902	39,730	39,673

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

Table 3: Human Capital Earnings Function, Age 15 – 64 Female Sample, 1984 - 1997

Variables	1984	1987	1989	1992	1995	1997
Constant	3.480*** (0.087)	2.809*** (0.083)	2.721*** (0.082)	3.337*** (0.082)	4.065*** (0.103)	3.970*** (0.097)
AGE	0.108*** (0.004)	0.118*** (0.003)	0.125*** (0.003)	0.098*** (0.003)	0.097*** (0.004)	0.095*** (0.004)
AGE^2	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
NOCERT	0.431*** (0.020)	0.346*** (0.019)	0.445*** (0.019)	0.414*** (0.018)	0.354*** (0.024)	0.388*** (0.025)
LOWSEC	0.950*** (0.024)	0.838*** (0.025)	0.890*** (0.024)	0.851*** (0.022)	0.783*** (0.027)	0.752*** (0.029)
UPPSEC	1.233*** (0.021)	1.149*** (0.021)	1.143*** (0.020)	1.154*** (0.019)	1.087*** (0.025)	1.116*** (0.026)
PREUNI	1.785*** (0.026)	1.660*** (0.024)	1.572*** (0.024)	1.573*** (0.022)	1.480*** (0.028)	1.569*** (0.028)
HIGHED	2.297*** (0.037)	2.205*** (0.032)	2.253*** (0.031)	2.240*** (0.029)	2.112*** (0.035)	2.183*** (0.033)
MARRY	-0.027** (0.012)	0.006 (0.011)	0.016 (0.011)	-0.043*** (0.010)	-0.045*** (0.012)	-0.085*** (0.012)
LNHOUR	0.555*** (0.017)	0.670*** (0.016)	0.648*** (0.016)	0.678*** (0.017)	0.571*** (0.021)	0.630*** (0.020)
R^2	0.36	0.38	0.36	0.38	0.36	0.37
Sample Size	23,068	25,485	26,847	27,604	18,256	19,463

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

Table 4: Determinants of Participation in the labour force using a Probit Analysis: 15-64 Female Sample, 1984-1995

Variables	1984	1987	1989	1992	1995
Constant	-0.038 (0.026)	-0.293*** (0.026)	-0.263*** (0.026)	-0.328*** (0.025)	-0.338*** (0.032)
NOCERT	-0.084*** (0.014)	-0.002 (0.014)	-0.009 (0.014)	0.094*** (0.015)	0.106*** (0.019)
LOWSEC	-0.327*** (0.020)	-0.215*** (0.020)	-0.301** (0.020)	-0.091*** (0.020)	-0.047** (0.024)
UPPSEC	0.456*** (0.019)	0.446*** (0.018)	0.410*** (0.018)	0.574*** (0.018)	0.561*** (0.023)
PREUNI	0.786*** (0.033)	0.770*** (0.028)	0.742*** (0.027)	0.916*** (0.026)	0.949*** (0.031)
HIGHED	0.941*** (0.056)	0.983*** (0.046)	1.066*** (0.045)	1.171*** (0.044)	1.249*** (0.052)
BELOW15	-0.053*** (0.003)	-0.048*** (0.002)	-0.053*** (0.003)	-0.063*** (0.003)	-0.059*** (0.003)
OVER64	0.052*** (0.011)	0.046*** (0.010)	0.077*** (0.010)	0.046*** (0.011)	0.070*** (0.013)
MARRY	-0.232*** (0.011)	-0.142*** (0.010)	-0.165*** (0.010)	-0.263*** (0.011)	-0.227*** (0.013)
URBAN	-0.118*** (0.013)	-0.106*** (0.013)	-0.089*** (0.013)	-0.032** (0.013)	-0.057*** (0.015)
RURAL	0.054*** (0.012)	0.014 (0.011)	0.032*** (0.011)	0.064*** (0.011)	0.032** (0.013)
PM	-0.119*** (0.013)	-0.109*** (0.012)	-0.112*** (0.011)	-0.070*** (0.011)	-0.142*** (0.014)
AGE	0.004*** (0.000)	0.008*** (0.000)	0.007*** (0.000)	0.007*** (0.011)	0.006*** (0.001)
Sample size	73,991	80,864	82,819	78,711	53,345

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

Table 5: Human Capital Earnings Function (Corrected for Sample selection bias), Age 15 – 64 Female Sample, 1984-1995

Variables	1984	1987	1989	1992	1995
Constant	3.676*** (0.109)	3.494*** (0.114)	3.310*** (0.110)	3.731*** (0.106)	4.704*** (0.129)
AGE	0.108*** (0.004)	0.116*** (0.003)	0.123*** (0.003)	0.098*** (0.003)	0.097*** (0.004)
AGE^2	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
NOCERT	0.447*** (0.021)	0.353*** (0.019)	0.455*** (0.019)	0.393*** (0.019)	0.319*** (0.025)
LOWSEC	1.000*** (0.029)	0.933*** (0.026)	1.010*** (0.028)	0.876*** (0.022)	0.810*** (0.027)
UPPSEC	1.170*** (0.029)	0.961*** (0.031)	0.991*** (0.028)	1.015*** (0.032)	0.877*** (0.037)
PREUNI	1.683*** (0.042)	1.357*** (0.043)	1.312*** (0.041)	1.360*** (0.044)	1.139*** (0.052)
HIGHED	2.177*** (0.054)	1.833*** (0.055)	1.906*** (0.055)	1.981*** (0.054)	1.685*** (0.065)
MARRY	0.011 (0.017)	0.080*** (0.014)	0.093*** (0.015)	0.031** (0.016)	0.058*** (0.018)
LNHOUR	0.555*** (0.017)	0.670*** (0.016)	0.648*** (0.016)	0.676*** (0.017)	0.566*** (0.021)
IMR	-0.218*** (0.070)	-0.632*** (0.074)	-0.558*** (0.071)	-0.378*** (0.066)	-0.578*** (0.075)
R^2	0.36	0.38	0.36	0.38	0.36
Sample Size	23,068	25,485	26,847	27,604	18,256

Figures in parenthesis are White heteroskedasticity-corrected standard errors.
*** is significant at the 1 percent significance level
** is significant at the 5 percent significance level
* is significant at the 10 percent significance level

CHAPTER 8

DISCUSSION AND IMPLICATIONS

8.1 INTRODUCTION

In this thesis, we have presented three chapters containing empirical findings from using various data sets (provided by the Malaysian Government and the private sector) to obtain estimates of the returns to education and training in Malaysia. The main objective of this chapter is to look into the implications of some of the empirical findings that we have obtained in the previous chapters. We will use the results to help us understand the Malaysian labour market, in addition to making an attempt to interpret the impact of past education and training policies in Malaysia from our results. We also endeavour to consider the role of rates of returns to education analyses in the formation of education and training policies in Malaysia using a brief analysis of the developmental state skill formation model. To set this in context, we will make some use of the developmental state skill formation model used in Ashton, et al. (1999).

Our source of reference, in addition to our own empirical results, will be based on using information obtained from interviews conducted over the summer of 2000 with various personnel in different institutions. Each interview lasted between 60 to 90 minutes. The personnel that we have consulted comprise those who are directly and indirectly involved in the policy making process. Secondary literature that is available on Malaysia within this area of research will also be utilised.

The main empirical findings in this thesis so far can be summarised as follows: -

(i) There are positive gross returns to training for women in Malaysia.

(ii) Full-time training appears to be more beneficial than part-time training.

(iii) The determinants of training analyses among women indicate that the higher the education levels the higher the likelihood that the women will participate in training.

(iv) Women who are credit constrained tend to be deterred from participating in training.

(v) There are positive and highly significant returns to all levels of education.

(vi) Higher marginal returns were accrued to higher levels of education, i.e. PREUNI and HIGHED. Within these two higher educational levels, the marginal returns at the PREUNI level was higher than that obtained at the HIGHED level.

(vii) The returns to the different level of education have been found to be fairly stable over time. It is only at the HIGHED education level that we find increasing returns over time.

The next section will examine the impact and implication of the above listed empirical results. Section 8.3 will contain an analysis of the developmental state skill formation model as advocated by Ashton et al. (1999) with reference to Malaysia. Section 8.4 will conclude this chapter.

8.2 EMPIRICAL FINDINGS AND ITS IMPLICATIONS

In Chapter 4, we reviewed studies where the rates of return to education were calculated for countries such as Australia and Vietnam. We have also attempted to summarise how the results could affect policymaking and reflect the educational policy in a country. For example, in Vietnam (Moock et al., 1998), subsidisation of the primary schooling level was called for when high social and private rates of returns for this level of education were obtained. The private rate of returns to the tertiary level was high while its social rate was low. This high private rate of return for the tertiary level was the result of an over-subsidisation of the higher level of education by the Vietnamese Government. Being a developing country where resources needs to be allocated efficiently, such results would allow the Vietnamese Government to note the implication of its education financing policies.

In Australia, retention and attendance rates at schools were found to be low for the indigenous adults. The rate of returns to education study conducted by Daly and Liu (1997) drew the government's attention to the fallacy in their assumption of increasing educational attainment among the indigenous groups so as to increase their employment rates and income. The low private rate of returns to post-compulsory secondary schooling indicated that the incentives to stay on in school were not attractive enough to keep the indigenous adults in school. Therefore, even though the Australian Government can and is willing to provide the education facilities to the aborigines, the low returns are disincentives to the indigenous adults in accumulating their human capital.

On the other hand, those from the indigenous group who had successfully completed their secondary or post secondary education were found to be the more able and highly motivated group. Daly and Liu concluded that this latter group of indigenous Australians would benefit from positive discrimination in the labour market. In addition, non-monetary benefits were also found to be important when calculating the returns to education for the indigenous adults. For example, the cost of sacrificing their hunting activities over education needed to be taken into account. Using such results, the Australian government would be able to identify possible inaccuracies in their educational policy.

In this section, we try to match our results with current educational and training policies in Malaysia. By doing this, we hope to have a better understanding of the Malaysian labour market and be able to identify some of the impact that the current and past educational and training policy has on the labour market.

The analyses in Chapter 5 estimating the private gross returns to training indicate that there are positive returns to training for women in Malaysia. Women that receive training had private returns of 19 percent to 36 percent based on the results obtained from our samples.[192] As information on training and the impact of training is still scarce in Malaysia, initial findings such as this could be disseminated to individuals (in this case, women in Malaysia) to provide the evidence and encouragement that training has substantial benefits. Studies of this nature, where the focus is on women would be able to provide evidence to the potential expansion of the female labour force in Malaysia. For example, results of this nature could be used to guide plans formulated by the Malaysian government to expand the local labour force via the participation of women in the labour force.

Our analyses reveal that the different types of training have different impact on an individual. For example in our analyses, full-time training appears to be more beneficial than part-time training. There is also a difference between the benefits obtained from government type training and the private type trainings.

In our study, the private type training appears to give a higher return compared to the government type training.[193] This finding points to the need and importance of obtaining and using aggregated training data so that the impact of different training programmes on an individual can be identified. The information presented here also needs to be updated (as our conclusions are drawn from a 1980 data set) to reflect any changes that may have

[192] In Chapter 5, we have also discussed the issues, which could be raised, from our first estimated sets of gross returns to training for women in Malaysia.
[193] In the 1997 World Bank study (World Bank, 1997), using the 1995 MITP data set, Government–run training institutes were found to have an insignificant effect on both the local and foreign firm productivity.

occurred in the training condition in Malaysia. Nevertheless, the results that we have obtained would appear to support the Government's move to encourage training provided by the private sector. In the Vision 2020 plans, the Government is keen on encouraging a more pro-active stance from the private sector when it comes to training their firm's workers.

The determinants of training analyses among women indicate that the higher the education levels the higher the likelihood that the women will participate in training. This result confirms that education and training are complements. Hence, women, in particular should be encouraged to achieve higher levels of education in order to obtain more training.

Our conventional probit analysis also indicates that individuals who are credit constrained might be deterred from participating in training. From this data set that we have used, the majority of the respondents were either sponsored by the Government or by employers. They may not be the ones who are credit constrained. However, those who are not able to receive sponsorships to participate in training (especially those who are not in employment) may not make concerted efforts to improve themselves by participating in training, which is self-paid.

Our finding implies that a woman, who is credit-constrained, would be unlikely to participate in self-paid training. When the latter situation occurs, it could affect the women's decision to enter into the labour force. If training is seen as a tool for providing an individual with skills needed in the labour force then we can say that without training, a woman could be deterred from participating in the labour force. This goes against the wishes of the Government to encourage female labour force participation. If a woman feels that she does not have the adequate skills to meet the needs of the labour force, she has the choice of choosing not to work compared to those who are actively receiving training.

Based on this finding, there may be a need to review the resources that are available to individuals to train.[194] This is especially so for those who are not employed, as they would not be able to utilise the current facilities which are provided by the Government, such as the HRDF or by the individual firms as the unemployed would not have access to the firm's training programmes.

Expanding on the issue of training among the women in Malaysia, we find that the role of women in the Malaysian economic development had received due recognition after the launching of the 1989 National Policy for Women.[195] These policy plans were formulated

[194] In Wong's 1997 paper on "Skills for Globalisation", the researcher had recommended that tax incentives in the form of a single deduction from personal income tax, should be given to encourage retraining and continuous skills upgrading by individuals.
[195] See Asian Development Bank, 1998.

in the Sixth Malaysian Plan, 1990-1995 and continue to exist in the recently launched Eighth Malaysia Plan, 2001-2006. The main aim of this policy appears to concentrate on the issue of equality and the promotion of women in the various sectors of the Malaysian economy. The agency that represents women in Malaysia is HAWA (Women's affair department) and they are responsible for improving the skills and knowledge of women in Malaysia. However, we are not aware of any special training programme that has been launched to assist women (especially those not in the Labour force) in the area of on-the-job training or training in general.

In the recent news,[196] a political party in Malaysia, the Malaysian Chinese Association (MCA) announced that a national project would be launched to train and equip non-professional Chinese women with the skills and knowledge to adapt to the current slowdown in the economy. However, studies on women in Malaysia are scarce. It is hence difficult to ascertain the outcome of the initiatives that have been carried out. The message that is however consistently conveyed is that efforts will continue to be made by the Government to ensure that the women in Malaysia are able to participate and contribute towards the economic development of the country. Hence, while we are certain of the inputs and efforts that are being taken to increase training among women in Malaysia, we do not know the outcome of these efforts.

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[196] The Star Online (2001), "MCA grooming women to spearhead recovery", November 2001.

The Government has been the key player in the education and training sector in Malaysia since independence. The role of the private sector started making its appearance after the launch of the Outline Perspective Plan 2 (OPP2) encompassing the Sixth and Seventh Malaysian Plan. In Chapter 6, using the 1997 HIS data set, we have found that there are positive and highly significant returns to all levels of education. The positive returns to those with NOCERT (whom we have assumed to have at least 4.5 years of education) indicate that a little bit of formal education is better than having none at all. This strengthens the Government's curriculum guideline for the primary school level, which focuses on the 3R's (Reading, Writing and Arithmetic). The implication of this positive return to the NOCERT education level is that there must be enough checks to ensure that all Malaysians are given the opportunity to obtain a decent level of education, especially in the rural areas where access to basic education may be restricted.

The highly positive and significant private returns at the tertiary level imply that there is an incentive for private funding at this level of education. Given the positive private returns, the private sector could be encouraged to increase the scholarships and/or loans that are currently available to students. Another issue involving the private sector with regard to tertiary education is the Government's wish to pass on the role of educating the Malaysian population to the private sector. The Government is keen on having the private sector to take over the role of an education provider while the Government becomes the facilitator or supporter of this role.[197] Some of the concerns, which could arise pertaining to this issue, are the cost of receiving education provided by the private sector at this level. Prior to corporatisation in the local universities, local institutions were heavily subsidised. However, when the private sector takes over, the cost to obtaining higher education could increase if proper monitoring of the role of the private sector is not implemented.

In addition, the quality of education at this level would need to be monitored, given the active private sector involvement[198] whereby profit figures may have precedence over the quality of education that is provided. The role of the National Accreditation Board (NAB) within the Ministry of Education plays the vital part of determining and evaluating the quality standards of courses offered and conducted by private higher education institutions (Razali, 1996). Interestingly, other than the NAB, there could be external pressure for private colleges to ensure that the quality of education is present and maintained. From one of our interviews,[199] we have been informed that the Quality Assurance Assessment (QAA) exercise conducted in Universities in the United Kingdom has an impact on the education that is provided by private colleges. The QAA affects the

[197] When the Government affirmed the role of the private sector in the higher education sector in an international conference held in June 2000, the International Medical University (IMU), a private medical college's vice president had noted that in order for this role to be effective, there must be a clear policy plan or monetary aid to assist in the growth of the private sector within the education scene (The Star (2000), "More Aid Needed for Private Sector to Grow," June 25, 2000.).

[198] In November 1998, a branch campus under the University of Nottingham was set up in Malaysia where courses offered allowed Malaysian students to complete a degree in Malaysia without leaving the country.

[199] Interview with Mr. Venkateswaran of TWU.

twinning programmes that a local private college is affiliated to. Therefore, given this link, the standards that are set by the QAA in the United Kingdom are expected to be adhered to by the local private college. This is done to ensure that the quality of education is maintained. Of course, this is also done to protect the reputation of the affiliated university but in the process of doing this, Malaysian students and Malaysians in general benefit.

The mix of the private sector's and Government's role in the higher education sector could raise a rather perplexed state whereby on one hand, there is a call for monitoring to ensure that social obligations are met and that the quality of education is maintained. On the other hand, there is a need for a more dynamic education system, one where changes can be made fairly quickly to meet the challenges of globalisation. Hence, there may be a need to find a balance between the two extremes of regulation and the dynamics of market forces.[200] The implementation of policies relating to this matter would need to have these issues taken into consideration.

[200] In a paper by Ashton and Sung (2000), the two approaches in skills formation for the development of an economy is discussed. The first approach is one that allows the market to form the skills needed for economic growth (that taken by Anglo-Saxon countries) and the other approach is one with the presence of the government in supporting the market to create the necessary skills. The authors conclude that the approach taken by the Asian Tiger economies has added a new dimension to the existing knowledge on the skill formation system or process in a country and may provide lessons for the other developing countries to learn from.

In Chapter 7 of this thesis, our returns to the different level of education have been found to be fairly stable over time. It is only at the HIGHED education level that we find increasing returns over time.

Our stable rate of returns to education trend for 1984 to 1997 seem to contradict the economic theory of diminishing marginal returns to human capital. This basic economic theory causes us to expect the returns to education to decline over time with increases in the stock of human capital.[201] In the Malaysian context, throughout this period of analysis, there was educational expansion at all levels of education (See Malaysia, 1981, 1984,1986, 1991a, 1991b).

The Malaysian Government had shifted its focus to improving the enrolment rate at the secondary education level in the 1970s (Razali, 1999). Primary school students were allowed automatic promotions[202] to the lower secondary level in the 1960s and this move required physical expansion for secondary educational purposes. The intention of this action was to expand the definition of basic education in Malaysia by three years to include lower secondary education. Educational expansion plans for the UPPSEC level was initiated in the Fourth Malaysia Plan, 1981-1985 when the idea of extending the basic

[201] As noted in Chapter 7, this theory is supported by the general trend of declining returns to education over time summarised in Psacharopoulos (1989).

[202] If the transition were not automatic, it would mean that a promotion to the next level of education would only be allowed if the student had passed an assessment examination, which would usually be taken in the last stage of the primary school cycle. The assessment examinations are still being carried out but the results are used more for streaming purposes rather than as an entrance requirement.

education in Malaysia from nine years to eleven years was suggested. Based on our results, it would appear that educational expansion at the different levels, namely at the LOWSEC and UPPSEC levels did not have much impact on the returns to these levels of education over time.

In order for the returns to education to remain stable alongside educational expansion, relative demand for more educated workers must have increased (See Gindling, et al., 1995). This then links us to our analysis using Katz and Murphy's (1992) simple demand and supply framework. Our demand and supply framework results do indicate that demand for skilled labour in Malaysia has increased alongside with the increasing supply of skilled labour.

The increased demand for skilled labour may be caused by a change in the skilled labour intensive technological change, i.e. the development of computers, which has been promoted by the Government in recent years.[203] Another reason which can be cited for the increase in demand is due to a change in the composition of employment from less skilled intensive manufacturing to more skilled intensive services and manufacturing.[204] These reasons seem plausible based on the economic development that has been occurring in Malaysia. We noted in Chapter 2 that during the NDP period, Malaysia

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[203] See Krueger, 1991 as quoted in Gindling, et al., 1995 and Green, 1998 for an examination of this issue in the US and UK respectively.
[204] This could occur when there is a change in the Malaysian comparative advantage as labour cost increase.

embarked fully into the industrialisation process via the launching of Vision 2020. In this Vision 2020, Malaysians were cautioned not to lag behind global changes. One of these global changes includes the move into the information age where Information Technology (IT) plays a major role. To assist Malaysia's step into this information age, the Multimedia Super Corridor was launched in 1996.[205] An empirical research on the causes of the changing trends of the returns to education and the demand and supply of skilled labour in Malaysia would confirm our speculation on the link between the Malaysian economic development, the returns to education trend and the demand and supply of skilled labour.

Supporting the call for more research into this area, it is noteworthy to mention that there are currently no studies, which looks into the impact of changes in technology on human capital in Malaysia. Information technology seeped into Malaysia's education and training policy in the Sixth Malaysia Plan. During the Sixth Malaysia Plan, a computer literacy programme was launched with the objective of exposing students to basic knowledge in computer literacy. The teachers were also exposed to computers and in 1994, computer courses were made compulsory to all trainees in teacher training colleges.[206] The commitment of the Government in promoting the use of IT in schools is

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[205] The Multimedia Super Corridor (MSC) is a 15 kilometres wide and 50 kilometres long information hub and serves as an industry park for IT companies.
[206] Abdul Rahim and Shamsiah (1998) conducted a study in three selected states in Malaysia and found that teachers in these three States did not have a high level of general knowledge about computers. Studies of this nature would enable the relevant authorities in the Government to design focused and objectively set training courses to meet the needs of the teachers in schools.

seen in the setting up of the Smart School concept on the 1st of January 1999. This initiative is being tested in 90 pilot schools. While these policies and actions prove to be a step forward towards the change in the world, there is a need to ensure that careful monitoring and evaluation of these programmes are carried out. The impact of these studies could help in the setting of clearer and focused skill formation policy in Malaysia. Another scope of research that is lacking in Malaysia is in the area of trade[207] and its implication and impact on human capital accumulation in Malaysia (See Gould and Ruffin, 1995).

8.3 THE DEVELOPMENTAL STATE SKILL FORMATION MODEL

The main theme of this thesis has been focused on the rates of return to education and training. In the previous section, we have noted how our rates of return to education and training can be used to interpret the development of educational and training policies in Malaysia. The rate of return estimates can also be used to analyse the condition of the Malaysian labour market. For example, from our demand and supply analysis, we are able to note that demand is increasing more than supply which is a possible cause of increasing relative wages from 1984 to 1997. This indicates that there could be a possible shortage of high skilled labour relative to low skilled labour in Malaysia.

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[207] Malaysia is an open economy with trade playing an important role (See, for example, Ghatak et al. (1997) and Athukorala and Menon (1997))

Judging from the explanatory power of the rate of return to education and training estimates, it would be interesting to see how our study and other Malaysian studies of this nature can be fitted into the Malaysian education and training policy formation process.

To do this, we will utilise the developmental state skill formation model derived by Ashton, et.al (1999). This developmental state skill formation model was found to be in existent in the 4 Asian Tigers.[208] The elements, which need to be identified within this developmental state skill formation model, are (a) what was the role of the Government in the skill formation process of the country? (b) What sort of mechanisms are being deployed to ensure that there will be an appropriate flow of skill supply? What and how are the institutions and mechanisms that govern the accumulation of human capital in Malaysia linked? And (c) what is the connection between the various stages of economic growth and the development of the education and training system?

This model looks into the institutions or as some would refer to as the actors or players within the political system of a country. We can also identify the mechanisms and linkages that bring these actors and players together via this model.

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[208] Ashton, et al. (2002) re-visits the development skill formation model by examining the condition of the four countries after the 1997/98 financial crisis.

8.3.1 *The Malaysian Case*

Ashton, et al. (1999), did a brief interpretation of this model on Malaysia in the concluding chapter of their book. The first element encompassing the role of the Government was identified as a prevailing element via the strong central control that the Government had and has over the curriculum (Ashton, et al., 1999) and skill formation policy. Further evidence to support this is noted in the Government's development philosophy, which upholds that the development system in Malaysia will be one that consists of free enterprises with active Government support and direction.

Vision 2020[209] provides the evidence that there are clear industry and trade policies in Malaysia. This policy allows the second element of the developmental state skill formation model to be identified in the Malaysian skill formation path. In Malaysia, the Outline Perspective Plans (OPP) contain long term plans while the five-year plans are the country's medium term plans. Mid-term reviews are conducted to evaluate these medium term plans while the short-term plans are contained in the annual budget usually announced in the last quarter of every year. By the end of the year 2000, Malaysia had completed four long-term plans. Although concerns for manpower[210] planning were

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[209] The ultimate objective of Vision 2020 is that Malaysia will be a fully developed country by the year 2020. It is envisaged that Malaysia should not only be developed in the economic sense but will be a nation that is fully developed in all dimensions: economically, politically, socially, spiritually, psychologically and culturally. Two of the nine challenges of the vision cover economic matters, i.e. the challenge of ensuring an economically just society. This is a society in which there is a fair and equitable distribution of wealth, and in which there is full partnership in economic progress and the challenge of establishing a prosperous society, with an economy that is fully competitive, dynamic, robust and resilient.
[210] We also use the term human resource to depict manpower in this Chapter.

raised in the late 1960s,[211] it was not until the launch of the New Development Policy (NDP) that education and training took on a new prominent role. Prior to the NDP or the OPP2 in 1990, training was mainly provided by the Government through the various training institutions, set up all over the country. In the OPP2, the role of the private sector was encouraged and attempts were made to increase the private sector involvement in this area.

There is sufficient evidence to support that Malaysia had a clear industry and trade policy. Prior to the launch of Vision 2020, policies leading to industrialisation were already in place. In 1986, the first Industrial Master Plan 1986-1995 was implemented. It was intended to provide a blueprint for an accelerated industrial development. Also, in 1986, the Promotion of Investment Act was introduced to promote manufacturing. This act was induced by the lack of technological issues in previous investment acts. This new act allowed the Government to place more emphasis on exports and technology development. The second Industrial Master Plan 1996-2005 was implemented after the first industrial plan ended.

While the role of the Government in the development of policies pertaining to trade and industry was clear and can be linked to the skill formation of the country, there were a

[211] A manpower planning section was created in the Economic Planning Unit in the late 1960s to look into manpower issues due to this concern.

few mismatches between the elements in the developmental state skill formation model with the characteristics of the Malaysian skill formation process as noted by Ashton, et al.

Firstly, although trade and industrial policies encouraging high value added industries were in place, Malaysia did not show evidence that it had moved from labour intensive industrialisation to more automated high capital-intensive industries. This point was also noted in Lall (1998). The literature appear to show that there is a consensus that the inability to move to higher value added manufacturing in Malaysia was due to the lack of skilled labour.

Secondly, as Ashton, et al. notes, although there were measures, which mimicked those taken by the 4 Asian Tigers (Taiwan, Singapore, Hong Kong and South Korea), a lot of these measures were still at the early stages at the time of the preparation of their book. Due to this, the impact or effectiveness of these measures could not be ascertained.

Thirdly, Ashton et al. claims that there were no clear linking mechanism between the demand for skills and the control of institutions responsible for this supply of skills.

It is difficult to counter the first two deficiency found in Malaysia's skill formation model when compared with the elements needed in a developmental state skill formation model. Labour shortages were prevalent for quite a while in Malaysia. Problems of this nature did not only affect the manufacturing sector but had also plagued the agriculture sector. Labour shortages were brought about by changes in the labour demand and supply trends, mainly arising from the launch of the National Economic Policy (NEP) in 1970. Labour demand shifted from agriculture to the tertiary sectors while rural-urban migration contributed to an imbalance in the agriculture labour supply. In the later years (i.e. the period of recession which began in 1985), labour shortages were claimed to have occurred due to a tight labour market situation attributed by the strong economic growth experienced in 1989 to the financial crisis in 1997.

In the following paragraphs, we will attempt to track the developments leading to this labour shortage. Labour intensive industries with better working condition and wages caused labour to move out of the agriculture sector and with additional encouragement from the NEP to promote urban activities, rural youths sought better jobs in the urban areas. Access to education had also improved; i.e. by early 1980, there were five universities established in 2 states – they were Universiti Malaya (UM), Universiti Kebangsaan Malaysia (UKM), Universiti Putra Malaysia (UPM) and Universiti Teknologi Malaysia (UTM), all located in the State of Selangor and Universiti Sains Malaysia (USM) in the State of Penang. Graduates from these universities were inclined to stay on in the urban areas to seek for jobs.

In addition to losing about 10 percent of its contribution to GDP in the 1970s, the agriculture sector was also losing its labour to the manufacturing sector. Although there were two main Government agencies, FELDA (Federal Land and Development Authority) and FELCRA (Federal Land Consolidation and Rehabilitation Authority), handling the agriculture sector by resettling farmers into schemes, which would be able to raise the income of farmers, there was not much that these two agencies could do to prevent the outflow of labour.

Surveys conducted by various associations and institutes confirmed that a large amount of work force was lost in this sector. The consequences of the labour shortage/loss were also examined. For example, a survey by the Rubber Research Institute of Malaysia found that labour scarcity had resulted in the loss of about 72,000 tonnes of rubber and 600,000 tonnes of palm oil in 1980-84 (Nayagam, 1991 cited in Pillai, 1992).

The United Planting Association of Malaysia conducted a survey only to find that an average of 21.8 percent of member estate workforce was lost in 1985 and with this loss of workforce, a loss of rubber valued at almost RM123 million was estimated. (Pillai, 1992).

To overcome these labour shortages, it appeared that restructuring of some sort had to be undertaken. However, instead of restructuring via mechanisation, automation and training, plantations began to rely on labour contractors, most of whom utilised illegal immigrant labour (Pillai, 1992).

Disappointingly, the Government agencies did not appear encouraging for they themselves had contractors employing as many as 35,000 foreign workers to clear, plant and maintain crops. By 1991, 30 percent of Malaysia's total work force in the agriculture and forestry sector comprised of immigrant labour.

By the end of this decade, it would seem rather difficult to lure local Malaysians back into the agriculture sector. Even if there were takers for a position in this sector, plantation owners were then reluctant to hire a local worker mainly due to cost reasons. For example, employers were not required to contribute to the Employee Provident Fund (EPF)[212] for foreign labour. There was a study, which established that net profits in rubber plantations increased directly with the proportion of immigrant labour in the workforce (Nayagam, 1991, cited in Pillai, 1992).

Within the secondary sector, the construction sector was also facing labour shortages (albeit, the flow of labour from the agriculture sector). Similar to the problems faced by

[212] The Employee Provident Fund (EPF) is a compulsory saving scheme in Malaysia. The savings act as a security measure in preparation for retirement by an individual. In this scheme, both the employers and employee will contribute a portion of their wages to the scheme. At the moment, employers will contribute 12 percent of the employee's wages (this is on top of what the employee receives as wages) towards the individual's EPF account while the employees contribute 11 percent of their wages into their EPF account.

the agriculture sector, the construction sector found it difficult to attract Malaysian workers at the prevailing wage rates. Like the agriculture sector, the construction sector turned to immigrants as an alternative source of labour. By 1987, the construction sector estimated that about 60 percent of the 350,000 workers in the industry were immigrants.

The recession in the mid-1980s did not help, as it was cheaper for employers to hire and use immigrant labour. To top the not-so-favoured condition of immigrants in the agriculture sector, the recession in 1985 also saw an outflow of Malaysians seeking better pastures in developed countries such as Australia, New Zealand and Canada. There were also outflows of Malaysian workers to Singapore and other neighbouring countries in the region such as Taiwan and Japan due to the more attractive returns with the difference in exchange rates.

Pillai (1992) provides quite a comprehensive write-up on the immigration and emigration situation in Malaysia throughout the period of 1970 to the early 1990s. According to Pillai, published statistics indicate that a total of at least 40,000 Malaysians have migrated to Australia, New Zealand, Canada and the US.[213] Given this situation, Pillai concluded that Malaysia had exported skilled and semi-skilled workers of the lower levels and imported only unskilled workers. At the higher levels, large numbers of Malaysian

[213] One could say that this brain drain occurrence in Malaysia might cause a downward bias in the estimated returns to education, especially if those with the highest returns are absent from the sample that we have analysed using the HIS data set.

professionals have migrated with migration being permanent and even though Malaysia had expatriates coming in, their stay was only temporary.

Through this assessment of the labour market condition, Pillai cautioned that if prevailing trends went unchecked, such conditions would impinge on Malaysia's development. Unfortunately, Pillai's fears proved to be true considering that labour shortages were reported in the manufacturing sector in the 1990s. According to Pillai, the shortages were most serious in the textile, electronics, rubber-based products, paper/printing/publishing and plastic based sub-sectors. For skilled manpower, shortages were for engineers, technicians, chargemen, tool and die makers, wiremen, computer personnel, welders, supervisors, machinist and filters.

This skilled labour shortage deduction was exacerbated by a World Bank (1995) finding that the aggregate manufacturing labour force had become less skill intensive between 1985 and 1991. The skilled labour shortage issue of the mid-1980s did not go unattended for in 1991, a cabinet committee for training[214] was set up by the Prime Minister. This committee consisted of various Government agencies and representatives from the private sector and other organisations associated with the supply of labour in the effected industries.

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[214] The Cabinet Committee on Training (CcoT) in 1991 identified similar industries noted by Pillai. The CCoT identified labour shortages in the construction industry, electronics, information technology, ceramic, chemical, engineering, foundry, plastic and textile and in the wood based products industry.

The Cabinet Committee on Training continues to exist till today and the role and the links that this committee has pertaining to human resource development in Malaysia will be discussed later in this section.

In considering the second problem within the Malaysian skill formation model, as noted by Ashton, et al., there were measures implemented by the Government to rectify some of the weaknesses within the education and training sector. However, the effectiveness of these measures was difficult to ascertain as they were still at the infancy stage. One of the measures undertaken that is usually linked to the Skill Development Fund in Singapore (the Malaysian HRDF has been noted to be based on the concept of this fund in Singapore) is the HRDF or the Human Resource Development Fund.

In 1992, the HRDF was launched to encourage firms to retrain and upgrade the skills of their workers. This fund encouraged training in the following areas: -

- Computer-related skills
- Craft skills, which include tool and die/mould making, welding, electrical fitting, machining and motor mechanics.
- Technical skills such as marketing, planning, credit analysis and machinery maintenance.
- Management/Supervisory training and
- Professional education and specialised skills training.

The HRDF has expanded its coverage to include the energy industry, training providers and private higher education institutions (with effect from the 17th of January 2000). In addition to this expansion, new training schemes have been designed to include purchases of training equipment and IT based equipment such as personal PCs.[215]

The World Bank (1997) study made an attempt to examine the HRDF using data obtained from the Malaysian Industrial Training and Productivity (MITP) survey data of 2,200 manufacturing firms in 1994 and 1995. Based on a crude test using retrospective responses from employers about how their training level has changed over the past three years, the World Bank research team was able to note that training in medium and large firms had increased. Small firms did not appear to have benefited from the HRDF fund.

This study by the World Bank is the only existing publicly published study[216] on the HRDF, in addition to the very few studies on training as seen in Chapter 4 of this thesis.

So far, we have only re-confirmed and enhanced some of the findings in Ashton, et al.'s brief interpretation of Malaysia's skill formation model. Based on the discussion so far, we can confidently note that the Government's role was central in the area of human

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[215] For a list of the different training schemes within the HRDF, see the HRDF website at http://www.hrdnet.gov.my/general.html.

[216] Another World Bank (1995) study contained a preliminary analysis of the HRDF. It however contained only a minor section describing and providing statistical information on the take-up of various schemes under the HRDF.

resource development in Malaysia. We can also confidently note that policies were in place, i.e. policies, which gave directions to the type of labour, needed in the economy, which empirically[217] and logically points to that of highly skilled labour. Having established this, we move on to identify the players within the Malaysian development planning system, in particular the human resource development or the manpower planning side of the development planning system. We do this to examine the third concern Ashton et al. raised pertaining to the Malaysian skill formation model. It is in this section that we pursue our intentions to identify if and how our rate of returns to education and training methodology can be used as a tool to examine the labour market for development planning purposes in Malaysia.

Firstly, we can identify four categories of players in the Malaysian human resources planning process. One, the co-ordinating unit, two, the skill producing agencies, three, the skill demanding agencies and four, the supporting units or agencies within the planning system. Aside from these four categories of policy makers, there is the Malaysian cabinet. The Cabinet approves all policy matters before *it is implemented in the country.* The Cabinet consists of Ministers who would usually head a particular Ministry and are also Members of Parliament. The Prime Minister heads the Malaysian Cabinet.

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[217] The World Bank 1997 study found high correlation between technological change and skill requirement in Malaysia. It was found that technological change is accompanied by higher skill requirements.

In Malaysia, the co-ordinating unit is the Economic Planning Unit (EPU). The Economic Planning Unit falls under the jurisdiction of the Prime Minister's Department. The more general functions of this unit are to formulate policies and strategies in development planning, prepare long and medium term plans, advise the government on economic issues, initiate necessary economic research and they are responsible for the preparation and evaluation of the development budget.[218] In terms of manpower planning, EPU is the planner, co-ordinator and monitor of this area of development. They (EPU) help identify manpower supply and help identify programmes for manpower development to satisfy the manpower requirements of the country in addition to forecasting employment and manpower requirements.

They aim to co-ordinate all planning functions at the national level and all other manpower related polices. They also monitor the implementation of policies related to manpower in both the private and public sector.

The skill producing agencies consist of three main Government ministries. One of the three main skill-producing agencies is the Ministry of Education (MOE), which deals mainly with the formal education system of the country. The general responsibilities of this Ministry are to collect, process and disseminate educational and financial data on

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[218] Information obtained via an interview with En. Amir, the Assistant Director of the Population and Labour force division under the Human Resources Department in the Economic Planning Unit. This interview was conducted in August 2000.

formal education in Malaysia and to conduct, plan and evaluate the formal education policies in Malaysia. The MOE will also obtain projections of the country's educational enrolment, output and teacher requirements. They are also responsible for the vocational education in the country.

Within the Ministry of Education, decision-making operates via a committee system. The Education Planning Committee (EPC) is the highest decision making body within the MOE.[219] This Education Planning Committee is the umbrella to eight steering committees which have been set up to formulate policy guidelines, co-ordinate and monitor the implementation of educational policies. The Educational Planning and Research Division of the Ministry of Education is the secretariat to the EPC. Other units involved in the educational policy making in Malaysia are the State Education Departments, which implements educational policy at the individual state level. There are also the District Education Offices, which supports the state level administration system and at the school level, the Headmasters/mistresses assisted by two to three Senior Assistants provide the necessary leadership in schools (Ministry of Education, 1997). This leadership by the headmasters/mistresses ensures that educational policies advocated by the Government are disseminated to the teachers and students at the school level.

[219] Based on an interview with Assistant Principle Director, Dr. Zahri Aziz of the Educational Planning and Research Division at the Ministry of Education Malaysia. This interview was conducted in September 2000.

The second skill-producing agency is the Ministry of Human Resources (MOHR). This Ministry has the responsibility of assessing the labour market developments and is expected to provide policy suggestions to EPU based on the condition of the labour market. They are also responsible in providing industrial training to meet the manpower needs of the country. This Ministry also deals with the private sector's manpower needs. Within this Ministry, there is the National Labour Advisory Council, which carries the tripartism principle that allows the Government, the employers and the workers to meet to discuss labour issues and labour market conditions.

The skill demanding agencies consist of the Public Sector Department, which as its name suggests co-ordinates and monitors the demand for manpower within the public sector. The private sectors will liase with the Ministry of Human Resources when and if they have problems with manpower supply.

The other supporting agency within the national manpower planning system in Malaysia is the Malaysian Ministry of International Trade and Industry (MITI). Within this Ministry, there are 14 divisions, which ensures that the main mission[220] of the Ministry is met. An agency under the jurisdiction of MITI is MIDA, the Malaysian Industrial Development Authority which co-ordinates foreign and domestic investments in

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[220] MITI's mission is to promote and safeguard Malaysian interest in the international trade arena, to spur the development of industrial activities and to further enhance the Malaysian economic growth towards realising Vision 2020 (http://www.miti.gov.my/orgn-mission.html).

Malaysia. This agency provides recommendations in the form of policies and strategies relating to industrial promotion and development to MITI. This link allows human resources issues relating to FDI and domestic investments to be brought to the attention of the Government when the need arises.

Another agency listed as the main supporting agency in the national manpower planning system in Malaysia is the Department of Statistics. The role of this Department would cover the data and statistical aspect relating to the Malaysian economy. DOS administers the Labour Force Survey (LFS) and the Household Income Survey (HIS), which is attached to the LFS once every two to three years.[221]

These four categories of players appear to be in the forefront of the manpower planning structure. We will also find that there are the "behind the scene" players who are not direct policy making agencies or groups. In essence, these "behind the scene" players provide input into the policies that are being derived. We will look at these different groups later on in this section.

Now that we have identified the players in the planning process, we will look into the links and mechanism that tie these institutions together. Earlier on, we had mentioned the existence of the Cabinet Committee on Training that was formed by the Government in

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[221] Even though DOS administers both the surveys, the ownership of the HIS is with EPU.

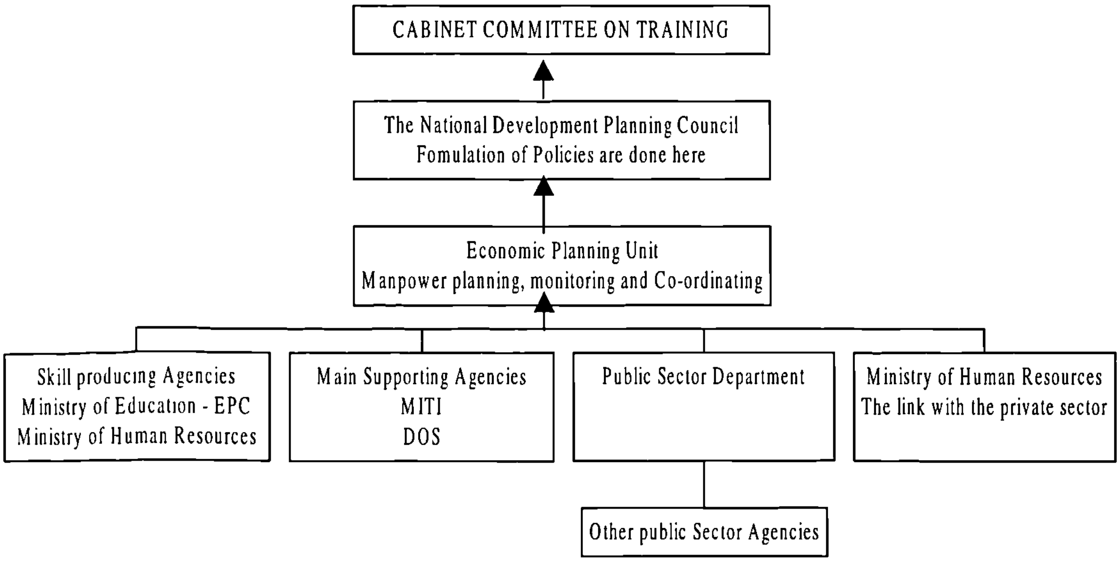
1991 (which will be known as the CCoT hereafter). When the CCoT was first established, its function was to identify and rectify the labour shortage problem[222] faced by the manufacturing sector. There were various committees within the CCoT, which consisted of academicians, employers, industry organisations and government representatives. These smaller committees were responsible for the different reports and data collection process to identify the problems in each of the industry.

Amalgamating the findings from each committee, among some of the CCoT's recommendations was that the Government training institutions should be privatised and that there should be an establishment of joint private-public machinery at the various levels to improve the co-ordination and integration of training in accordance with national needs (Wong, 1997). Our first identified link revolves around the CCoT and the other main agencies, which we have categorised earlier.

We illustrate this link in Figure 8.1 and the arrows in our figure indicate the hierarchy of reporting.

[222] With reference to the skills, the report of the CCoT seemed to indicate concentration or attention on the specific skills required by the individual industries.

Figure 8.1: The Manpower Planning System in Malaysia



The Secretary General of the Government heads the National Development Planning Council (NDPC) and its members are the various heads of department. The NPDC formulates the policies based on the recommendations by the various agencies. Before the policies are being formulated this Council will ensure that the policies are within the development criteria.

To explain this development criterion, we would have to look back into the Malaysian history. The NEP is the reference point for all development plans in Malaysia. The NEP saw the first major social structure revamping of the multiracial Malaysian population. To achieve the aim of creating a viable and dynamic commercial and industrial community of Malays, it was declared that the Bumiputera ethnic group must undertake 30 percent of stockholding or equity in businesses.

This would not only require a change in the equity holdings of any businesses but would bring about a change in the employment structure. One of the aims of the employment structure was to ensure that employment in the various sectors of the economy and employment by occupation levels would reflect the racial composition of the country. For example, the Chinese were the dominating group in the commercial sector. However, the composition of the population depicted a rough structure of 60 percent Malays, 30 percent Chinese and the remaining 10 percent of Indians and other ethnic groups. The NEP was aimed at rectifying the traditional distribution pattern of employment, characterised by the concentration of Malays in the agriculture and other primary sectors and in simple and unskilled occupations, with non-Malays, particularly the Chinese, almost completely dominating the different skills of the modern sector.

According to Onozawa (1991), the employment-restructuring policy implemented under the NEP came in the form of Government interventions in the labour market with a view of increasing the Bumiputera employment share to about 50 percent in manufacturing and other sectors so as to reflect the ethnic composition of the population.

Part of this employment restructuring involved the Government's effort to provide better education opportunities to the Bumiputera group as a means of improving their employment situation. Hence, in the early 1970s, a quota on Bumiputera enrolment at universities was placed at 70 percent. The Government and other agencies, which the

Government represented, also placed this quota on scholarships that were to be given out. This quota system became a distinct characteristic of the education and training condition, especially at the higher education level in Malaysia. Hence, in all the policy that is formulated, this criterion of ensuring appropriate levels of Bumiputra participation must be met.[223]

Within each skill-producing agency, we can see different mechanisms working. The Ministry of Education, as we have explained, works within a committee system whereby the various committees work under the EPC. From Figure 8.1, we can see that the policies that are formulated by the EPC within the Ministry of Education could be brought forward to EPU as the main co-ordinating agency. The link continues till it reaches the Cabinet where most policies are approved.[224]

In the Ministry of Human Resources, there are various councils, which carry the tripartite principle that allows both worker and enterprise participation at the Federal level. It is within this kind of combination that will ensure that Government policy relating to manpower can be disseminated to the employers and employees alike.

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[223] This criterion continues to prevail in the Vision 2020 plans. In a working paper presented by the Prime Minister to the Malaysian Business Council on the Vision 2020 plans. It is stated that "In the development of human resources, we cannot afford to neglect half of the population, i.e. the Bumiputras". (http://www.jaring.my/isis/mbc/2020.htm)

[224] It is noted that certain policy matters in education that have wider ramifications are referred to the Cabinet before final decisions are made (Ministry of Education, 1997).

In order to encourage input and/or feedback from the private sector, the Government has created different groups by inviting participation from the private sector. One of these groups is the Malaysian Business Council (MBC). This Council, according to Wong (1997) has 9 committees, whereby one of the 9 committee covers issues on human resource development (HRD). This HRD committee comprises representatives from key Government agencies, directly involved in education and training, individuals from the private sector and representatives from the education and training institutions. In addition to the Malaysian Business Council, there are the non-profit organisations such as the Malaysian Institute of Economic Research (MIER), a think-tank of the Government and the private sector. MIER's responsibilities include undertaking research on various issues in the country. Other than MIER, the Institute of Strategic and International Studies (ISIS) is another non-profit organisation that plays a consultative role to the Government. Both the consultative roles of MIER and ISIS takes place at the National Development Planning Council level, i.e. the final stage of the Malaysian development planning machinery before the policy is scrutinised by the Cabinet.

Although the Malaysian Business Council, MIER and ISIS are not direct policy making institutions, they constitute an important source of policy input for Government agencies in Malaysia (Wong, 1997).

So far, we have shown the links between the agencies within the Government and the link between the Government and the private sector in the process of formulating HRD policy in Malaysia. We will now try to bring in the role of workers in Malaysia and see how they fit into the model of skill formation.

The national labour centre or the main trade union of workers[225] in Malaysia is the Malaysian Trade Union Congress (MTUC). MTUC has 210 affiliate unions, which cover various industries, e.g. plantations, the manufacturing sector and service sectors.[226] The participation of the trade union in influencing the education and training policy matters in Malaysia can be seen via the various forums of discussion such as the National Labour Advisory Council which meets once every 4 months to look into the labour and manpower issues in Malaysia. The MTUC is also represented on the National Economic Action Council (NEAC), which was established as a consultative body to the Cabinet after the financial crisis in 1997.

In addition to having a voice in the various forums of discussion influencing the human resource development policy, one of MTUC affiliates, the Transport Workers' Union (TWU) has a technical college under its wings. The Workers Institute of Technology (WIT) started as a training centre for worker member's children to give them employable

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[225] The workers registered with a union are usually considered as those with lower skill levels. This represents a resourceful group of people to have as skill levels are increased.
[226] We conducted an interview with Mr. K. Soma Sundram, the Education Officer of the MTUC in August 2000.

skill in 1975.[227] It started as an institution for those who were not able to continue further in the formal academic path of education. However, today, WIT no longer restricts their registration to the family members of the TWU but is open to the public wishing to obtain vocational skills.

WIT courses are generally vocationally orientated, covering skills such as welding, electrical and so on. Courses offered range from 2-year technician courses to full degree courses where twining programmes with overseas institutions are offered. According to Mr. Venkateswaran, the courses that are offered are based on the demand of the market. Its courses have progressed from teaching assembly line type skills to high technology manufacturing skills. This is in line with the change in the scope of skills required in the country. WIT is conscious of the changes in the market needs and Government policy heading towards higher value added manufacturing, i.e. the shift from heavy duty working welders to one of innovation (skills of the hands to brain skills).

In addition to offering courses to the general public, WIT also serves employees in different organisations. When required, WIT would tailor make courses to meet the employer's requirements. This requires the joint effort between the employers themselves

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227 An interview with Mr. S. Venkateswaran, the Executive Secretary of the TWU was conducted in August 2000.

and the trainers at WIT. WIT courses are recognised by the HRDF under its PROLUS training scheme.

So far, we have attempted to highlight the major links between the various institutions, which influences the skill formation in Malaysia. Although we cannot deny that the main decision making body is the Cabinet which is led by the Prime Minister, we can find that the derivation and drafting of policies pertaining to skill formation are done through the interaction and linking of various Government agencies with EPU being the main co-ordinating unit. The responsibility of each agency is clearly spelt out for each to work within the framework for Human Resource Development in Malaysia. The involvement of the private sector is advocated via the tripartite concept whereby the views of the industry are taken into consideration in the drafting of a particular policy, in our case, policy matters relating to education and training.

The links made here in this section appear to contradict the opinions of Ashton, et al. whereby they were in the opinion that there was a lack of clear linking mechanisms between the demand for skills and the control of institutions responsible for their supply (Ashton, et al., 1999). The co-ordinating body, i.e. EPU ensures that communication lines are open between the various Government agencies. This link is maintained even when special task forces are established to look into a particular matter within the economy. For example, in January 1998, the National Economic Action Council (NEAC) was established by the Prime Minister to look into the recent financial crisis of 1997. EPU played its co-ordinating role in addition to being the secretariat to this newly established council.

In terms of the issue of the Cabinet making the final decision, the Cabinet meets once a week and we believe that this will allow the quick tabling of new policy matters or amendments to existing policies to ensure that the required measures are implemented. In terms of the flexibility of such a planning system, one can argue that because the policy making decision goes through a long system of many various groups and stages, flexibility is reduced. However, if one were to consider the fact that the decision comes from one body, the Cabinet, when a crisis or problem occurs, decisions can be taken fairly quickly which could result in actions such as the setting up of a special committee to look into the details of the problem or crisis.

So far, we have identified the institutions involved in the Malaysian human resources planning system. We have also presented our explanation on how and where these institutions are linked together. This interaction between the various institutions and the mechanisms that ties them together allows economic policies to be disseminated to the relevant agencies and parties involved. Within the skill formation context, the dissemination of information will enable the skill-producing agencies such as the MOE and the MOHR to identify the type of skills that is required in the Malaysian Labour

Force in order to achieve the target of the economic policy. Policies are then formulated according to the needs depicted by the findings and recommendation from each individual agency. For example, when the NEP was launched after the 1969 riots from the recognition that there was a racial imbalance in Malaysia, policies were formulated to solve the problem. As noted, the employment policy was one of the many issues that arose. Thirty percent of employment had to consist of Bumiputras. Businesses adhered to this policy and by the end of 1990; part of the target of the NEP was achieved. This would not have been possible if a framework for human resource strategic planning did not exist.

Although there is much to be ascertained given the limited information on the achievements of the actions taken with reference to the Malaysian skill formation scenario, we are able to detect some sort of fit between the developmental state skill formation model developed by Ashton and the Malaysian skill development scenario. The "fit" would appear to be more appropriate during the later stages of development, especially during the tenure of the Sixth and Seventh Malaysia Plans. In the earlier stages of development, namely during the Fourth and Fifth Malaysia Plans, labour shortages were faced. This shortage of labour gives the notion that the system had failed at some stage of planning. Although government induced policies (e.g. IMP1 and 2) were implemented, the link between the skill producing and skill demanding agencies was weak. This weakened link depicted by the labour shortage hindered the smooth movement from low value added manufacturing to higher value added manufacturing. We claim that there is a plausible fit[228] between the development state skill formation model and Malaysia in the later stages of development given the introduction of Vision 2020 and steps undertaken by the Government in the Sixth and Seventh Malaysia Plan. Vision 2020 comes across as a policy that aims to take Malaysia to a higher level of growth with one of the challenges targeting on the utilisation of human capital (and the emphasis on skills and not labour per se) in Malaysia. Policies in the Seventh Malaysia Plan and in the most recent medium term plan launched, i.e. the Eighth Malaysia Plan, 2001-2005 indicate Government intentions to counter the shortage of skilled labour in Malaysia. The Government aims to gradually reduce Malaysia's reliance on unskilled foreign workers[229] and are enduring to attract educated and skilled Malaysians working overseas to return home. The incentives offered include the granting of required permanent status to spouses and tax exemption on personal effects.[230]

Even though we find that the developmental state skill formation model may fit the current Malaysian scenario better, concerns pertaining to the effectiveness of this system lingers given that skilled labour shortages are prevalent. Wong (1997) believes that the

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[228] This fit that we deliberate on may be argued to be imprecise given that skill shortages continue to prevail in the Malaysian economy.
[229] The implementation of this policy would need to be executed carefully. The stop-go policy taken by the Government in previous years was said to have caused confusion among employers (World Bank, 1995).
[230] New Straits Times (NST), "Economic Report 2001/2002," 20 October 2001.

system can be effective only if there is constant feedback and input by enterprises into the planning machinery.[231]

In Psacharopoulos and Woodhall (1985), this input and feedback encompasses methods such as the manpower forecasting, labour market analysis and returns to education investment analysis (i.e. the rate of return analysis and the cost-benefit analysis). Within the manpower forecasting method, Psacharopoulos and Woodhall (1985) discussed four techniques. The four techniques listed are the employers' estimates of future manpower requirements, international comparisons, manpower population ratios and extrapolation of fixed input-output ratios.

In Malaysia, a couple of the methods mentioned in the above paragraph have been used as part of the input and feedback within the human resource planning system. Labour market analysis using tracer studies and labour market indicators and manpower forecasting via the collection of data in employer surveys have been used. The former method of feedback using labour market indicators includes data collected by the Ministry of Human Resources, Ministry of Education and EPU on education, employment and wage trends. An example of such data is the Labour Force Survey (LFS), which is carried out by DOS every year. Tracer studies were conducted in Malaysia in 1980 by the Institute Teknologi Mara (ITM) on their graduates (as reported in Psacharopoulos and

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[231] A list of policy recommendation based on the researcher's findings is presented in Wong (1997).

Woodhall, 1985) and a 1983 tracer study of Universiti Malaya graduates (as reported in Lee, et al., 1995).

According to Lee, et al. (1995), Malaysia's first attempt at manpower forecasting was done in 1973 where estimates of manpower requirements for 1976 to 1980 were estimated. The researchers went on to note that the manpower projection from this survey were revised with each medium plan starting with the Third Malaysia Plan, 1975-1980.

In this chapter, we would like to highlight another source of input and feedback that can be used. This input and feedback is the rate of returns to education and training estimates. In Chapter 3, we have noted the various methods that are available and have been used to calculate the rate of returns to this form of investment (namely, the Human Capital Earnings Function and the Cost-benefit analysis). In Chapter 4, we acknowledge and review some of the studies, which have provided estimates of such rate of returns in Malaysia.

The manpower-forecasting tool in assessing the condition of a country's labour market has been widely used in developing countries.[232] Using the weak points of this method of planning, researchers have drawn attention to the usage of labour market analysis as a

[232] Adams et al. (1992) contains excerpts of different country experience in using the manpower-forecasting tool for planning.

better tool to monitor the labour market (See Psacharopoulos (1991) and Adams, et al. (1992)). There are also those who have decided to remain eclectic given that there is evidence[233] that point towards the need to use a combination of the various methods.

In Malaysia, the manpower forecasting and labour market analyses are used in helping the Government to assess the Malaysian labour market. Although the rates of returns to education estimates were available, it is not clear how these results were used to derive and influence education and training policies based on our knowledge and finding from our interviews.

Some of the extreme criticisms of using rate of return analysis results to gauge labour market conditions are that there is zero elasticity of substitution between skilled labour and that students acquire more education for non-economic reasons only. One could also argue that the rate of return results provide gauges of past event and therefore is not very forward looking. On top of these reasons, there is an argument that input coefficients in schools are fixed and hence, in order to meet future demands for manpower, they must firstly be predicted to ensure that resources are available.

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[233] Psacharopoulos and Woodhall (1985) quoted two studies (i.e. Hollister (1983) and Dougherty (1983)) which arrived at the conclusion that both methods need to be used side by side.

However, our analysis and discussions suggest that the rate of return estimates could be a potential tool for the analysing and understanding of the Malaysian labour market. Theoretically, we can argue that if wages are reflective of productivity, it is then justified to use relative wages to provide signals of the demand and supply of labour. The argument can be extended by noting that students do acquire more education for economic reasons and elasticity of substitution between skilled labours is not zero.

From an empirical and practical point of view, we are of the opinion that the resources are available within Malaysia to perform the basic requirements of one of the few rates of returns to education and training methods. For instance, the availability of data sets such as the Labour Force Survey combined with the Household Income Survey allows a basic Human Capital Earnings Function to be analysed. Secondly, we are able to justify the results that we have obtained in our rate of returns to education and training analysis. By being able to do this, it gives us an indication that the model, which we have used in this thesis, is suitable for explaining the Malaysian labour market condition.

Additionally, by using the skill formation process, we can identify where the rate of return analyses could be used in the manpower planning system. The information obtained from the rate of returns studies could be used during planning discussions between the Government and the private sector. In our discussion, we have acknowledged the indirect link between the private sector (e.g. the Malaysian Business

Council) and the Government in the manpower planning process. We think that during discussions of this nature, information pertaining to the rate of returns to education and training would, firstly, provide an indication of the labour market condition. Secondly, the results could also be used as a tool to notify those funding education and training of the returns that is ahead of the investment.

This interaction between the Government and private sector is deemed to be important, as it would help secure a level of commitment between the two key players of a skill formation system. In Green (1998b), it is noted that commitment needs to be secured from three major players in order for a successful skill formation system to be achieved. These three players consist of the state, the individuals and employers. We believe that when the commitment to train and educate is evident among the employers and the Government, the individuals could then be motivated to commit themselves to acquire skills, both at school and at work.

As in any normative economics, we will find disagreements. Amidst this controversy, we do not wish to be construed as a strict rate of returns estimate follower but would like to maintain the view that the rate of returns to education and training estimate should be used alongside the other tools used for human resource planning purposes.[234]

[234] In Psacharopoulos and Woodhall (1995), it is noted "the real world obviously lies somewhere between these two (i.e. manpower forecasting and labour market analysis) extremes" (parenthesis added).

On this note, we draw attention to another significant finding from this thesis, which is that pertaining to the availability of data, especially data on the labour market. The state of labour market data is still not satisfactory in Malaysia. Although the Labour Force Survey and Household Income Survey exist, the content of information collected via these two surveys could be improved. There is currently no information collected on training in these two surveys and given the fact that these are national surveys, the Government should seize the opportunity in these surveys to obtain additional information on the education and training scene in Malaysia. This concern is an issue that is constantly raised in majority of studies conducted on Malaysia (See Lee, et al., 1995). These studies calling for better labour market data collection includes those conducted by the Government (See EPRD, 1997).

This drawback hampers the creation of a useful and updated database of labour market analysis, which can provide concrete evidence of the happenings in the labour market on the whole, and the education and training sector in particular. This is vital for the future of the Malaysian skill formation process, especially given this time period where the Government is seriously attempting to shape the Malaysian P(roduction)-economy into a K(nowledge)-economy.

8.4 CONCLUSION

The main objectives of this chapter were twofold. Firstly we have used our empirical findings from two different data sets, the Malaysian Family Life Survey and the Malaysian Household Income survey to provide an understanding of Malaysian labour market conditions. We have discussed how our findings correspond to the Malaysian labour market and have also highlighted some future research needs for this sector.

Secondly, we briefly examined the developmental state skill formation model used by Ashton, et al. to analyse the skill formation process in the 4 Asian Tigers before it was plagued by the financial crisis in 1997. We have examined some of the elements noted in this model by tying it to the human resource situation in Malaysia. While we were able to confirm some of the findings suspected to be prevailing in Malaysia by Ashton, et al., we have also attempted to identify the institutions and/or players that are directly and indirectly involved in the human resource development policy making in Malaysia. We have noted that while the framework for human resource development in Malaysia is in existence and is intact, there is a need to improve on the effectiveness of the system.

We have also attempted to use the Ashton et al. model to examine the feasibility and possibility of using the rate of returns to education and training analysis as part of the Malaysian Human Resources strategic planning process. There are arguments for and against the usage of the rate of returns to education and training analysis just as there are the pros and cons of the strict usage of manpower requirement methods.

The rate of returns to education and training analysis does not appear to be one of the features in the current Malaysian Human Resource strategic planning process. The methods currently used are the manpower forecasting method and one of the components of the labour market analysis method (e.g. using the tracer studies).

Having examined some of the issues involved, we are of the opinion that the rate of returns to education and training estimates could be a potential evaluating tool. This recommendation is subject to the condition that the quality and availability of labour market information is improved. This rate of returns to education and training estimates should be used alongside other manpower planning methods. We will conclude the thesis in the next chapter.

CHAPTER 9

CONCLUSION

The rising government expenditure on education by the Malaysian Government triggered the main question posed in this thesis. In this thesis, we aim to examine the role that education and training played amidst the economic development in Malaysia. Our empirical work revolves around the usage of the human capital earnings function, one of the few methods that are available for examining the returns to investments in education and training. This method appeared to be the most suitable method to apply given the nature of the data sets that were available.

This thesis is divided into seven main chapters. Out of these seven chapters, three chapters detailed the statistical side of the research. In this concluding chapter, we would like to summarise the main findings of each chapter, drawing attention to the important contribution of this thesis. We close this chapter with a brief review of the areas for future research.

In Chapter 2, we have noted two growths in Malaysia. The first growth is the economic growth in Malaysia and the second growth, the human development or the growth of human capital in Malaysia. This chapter was a background investigation into these two areas of development in Malaysia. We have divided Malaysia's economic development into three time periods, each depicting the different stages of policy development in Malaysia. Within each period, we looked into three main areas, the changes in the real economy, the changes in trade strategies, the changes in the labour market and the role of education and training within the country. The role of education and training in Malaysia was foremost as a nation-building tool. In the later stages of development, education and training was taken to a higher level of producing a productive and skilled labour force.

We ended Chapter 2 with an overview of the human capital achievement in Malaysia. We concluded that the Malaysian Government, which is the bulwark of economic development, had used various combinations of trade and development policies to achieve the high economic growth in the past three decades. Alongside this achievement, we detect a positive development in the Malaysian human capital factor. The existence of a human capital base is ensured by the growing Malaysian population while indicators such as the growing expenditure on education and training, increasing HDI estimated by the UNDP gave us the positive outlook on Malaysia's stock of human capital. The information that we have gathered in this chapter increases the interest to know and identify the link between these two areas of development.

In Chapter 3, we lay out the various econometric methods used to measure the contribution of education and training in an economy. We have divided our discussion into the macro approaches and the micro approaches. In line with the nature of our empirical work, we have placed emphasis on the micro approaches and have taken a step further to list the advantages and potential problems with each of the micro methods discussed. We have noted that with the constant changes in technology, the methods of quantifying and measuring the contributions of human capital in an economy will become more sophisticated. At the same time, we have also highlighted the importance of being able to interpret, understand and use the results derived from the so-called sophisticated methods.

The next chapter in line, Chapter 4 reviews the existing literature providing evidence on education and training and its link with the economy. We started the chapter by reviewing the different studies conducted elsewhere other than Malaysia and have divided the studies into those conducted at the macro level and those conducted at the micro level. We looked at the implication that these studies had in their individual countries. In the next part of the chapter, we examined some of the underlying issues that these studies raised. From this, we raised several questions pertaining to education and training in Malaysia. Among some of the questions, which we asked were how much is human capital contributing to economic growth in Malaysia? What did the rate of returns to education and training in Malaysia reveal?

To answer these questions, we reviewed the existing studies that were available in Malaysia with regard to education and training. We found that there were loopholes in the

the research literature, which needed filling in, in order for us to understand and determine the condition and the role of education and training in Malaysia. Some of the major literature loopholes identified were that there were no returns to training estimates in Malaysia, we did not know who were likely to participate in training and there is a need to obtain up-to-date rate of returns to education estimates in Malaysia.

In Chapter 5, we obtained the first rough estimates of the gross returns to training for women in Malaysia. We find that there are positive returns to training whereby our results show returns between 19 to 36 percent. We have also managed to break down the training information into the various types of training and find that full time government and private training are more beneficial than the part time government and private training. We also find that the longer time ago that the women received the training, the higher the benefits. We think that this could indicate the value of experience that the women had in addition to indicating possible scarcity of trained women given the age of the women in our data set.

We have also been able to examine the determinants of training which points towards the complementary nature of education and training. We also find that being credit constrained could be a barrier to women's participation in training from our probit analysis. Consequently, a review of the resources for training may need to be conducted. This implication is highlighted in Chapter 8.

In Chapter 6, we have provided an updated set of the rate of return to education in Malaysia. We did this by using the latest set of the HIS data provided by the Malaysian Government. The main findings indicate that returns to all levels of education remain positive and highly significant. We have also seen that our results display a rising pattern in the average private rate of returns to the different levels of education. Our marginal gross returns to education analyses indicate that there are benefits to be reaped if Malaysians were to proceed on in the ladder of education. We conclude that education remains beneficial for the people in Malaysia and draw attention to the potentiality of the role of the education and training sector in relation to the economic development of Malaysia.

The availability of consistent sets of the Malaysian Household Income Survey data allowed us to deduce that the returns to education at all levels of education (with the exception of the HIGHED education level) in Malaysia are stable. This stable rate of returns to education trend is the main finding (and the first of its kind for Malaysia) in Chapter 7. We used the 1984 to 1997 HIS data sets to help us determine the trend of the rate of returns to education. The stable rate of return to education finding places Malaysia together with countries like Taiwan, Brazil and Norway, *inter alia*, where similar results were obtained. Although the finding of stable rate of return to education deflects from the conventional result of diminishing marginal returns to human capital as advocated by Psacharopoulos (1989), the results for Malaysia are in no way peculiar.

Our demand and supply analysis of labour and relative wages indicates that there was a rise in demand for skilled labour alongside a rising supply of skilled labour. This phenomenon allows the rates of returns to education to be stable in the presence of an increasing relative supply of skilled labour. It is also in this chapter that we have justified Malaysia's condition of higher marginal gross returns to higher levels of education. We concluded that these results are possible given the industrialisation time period in Malaysia.

In Chapter 8, we bring together our empirical results of Chapter 5, 6 and 7 to provide information on the condition of the Malaysian labour market and to analyse how our results fits into the education and training policy implemented in Malaysia. We do this based on the notion that rate of returns analysis can be a tool for understanding the labour market better. We managed to link our findings to the current and past condition of the labour market and have found evidence to provide support to our results.

Firstly, our determinants to training results showing that lack of credit could be a barrier to training indicates that there may be a need to review the resources, which are available to individual to train. Our positive private rate of returns to education indicates that there could be more private sector funding in education, especially that undertaken at the higher levels. By using a simple demand and supply framework, the stable rate of returns to education in Malaysia was explainable. The results from the demand and supply framework were plausible given the economic development that has been occurring in Malaysia. We have examined these issues in detail in Chapter 8 of this thesis.

We have also attempted to be evaluative by using the developmental state skill formation model derived by Ashton, et al. (1999) to analyse the possibility of using the results derived from the rate of return to education studies in the Malaysian skill formation process. Whilst doing this, we were able to detect a plausible fit of the developmental state skill formation model in the Malaysian context based on the conditions found in Malaysia. The developmental state skill formation model seemed befitting in the later stages of development in Malaysia. We did not think that the developmental state skill formation model could be applied during the earlier stages of development, namely during the Fourth and Fifth Malaysia Plan periods as there were prominent shortages in the labour market. This is however, an area for further research given that we are not able to provide evidence to counter the two deficiencies noted by Ashton, et al.

General Conclusions and Future Research.

Education and training in Malaysia has evolved from a nation-building tool to a vital industrialising tool. Vision 2020 and its sub strategies give emphasis to the role of education and training in Malaysia. Our empirical findings support this role and draw us to note the potential expansion of this sector in Malaysia. This thesis also highlights the need for an effective skill formation system in order to ensure that the benefits of education and training are reaped to its fullest. In this thesis we have considered the plausible and possible fit of the developmental state skill formation model within the Malaysian context. From this evaluation, we find that the information drawn from the rate of returns to education and training studies could be an appropriate input and feedback technique. We advocate that the rate of returns analysis should be used alongside the current methods adopted, i.e. the manpower requirement and labour market analysis techniques.

The findings of this thesis also show that there is much to be researched on in the Malaysian labour market. Before we proceed into this issue of future research prospects, we would like to note the call and need for improvements in labour market data in Malaysia, especially with the recent developments in Malaysia, as we shall see later. The adverse condition of data pertaining to labour markets especially that pertaining to training can be a barrier to proper empirical work being carried out. The findings from relevant empirical work could be used as guidelines for better policy making. Future research areas based on the current development in Malaysia are as presented below.

The K-Economy

The K-Economy plans were recently announced in the third Outline Perspective Plan (OPP3)[235] launched at the beginning of the year 2001. This K-Economy aims to use knowledge as the key factor driving growth. Prior to this, the total factor productivity (TFP) concept or productivity was a driving force to higher economic growth in Malaysia. This K-Economy concept is one of the strategies undertaken to lead Malaysia to achieve the objectives of Vision 2020. The K-Economy call is a human capital issue, which will naturally involve the Malaysian education and training sector.[236] The future of the K-Economy also depends on how well Malaysians are able to adapt itself towards this shift in strategy.

Recent researchable issues pertaining to the education and training sector include the following, which from our knowledge have been assigned to ISIS, one of the two think tanks in Malaysia.

- The issue of quality in Malaysian education.
- Second, the role of the private sector in education. Being a profit orientated institution, there has been concerns over the issue of profit over quality. This situation is also warranted by current trends, which indicates rapid development in private education. It also ties in with the first issue of quality. In addition, due to

[235] See Chapter 5 in the OPP3 (Malaysia, 2001a), "Developing Malaysia into a knowledge-based economy" for the full details of this plan.
[236] The Star (2000), "K-Economy: Impact on Malaysia", 7th September 2000.

the economic crisis, many private institutions have implemented the 3+0 programmes whereby students need not spend a year or two abroad to complete their degrees. Is this move affecting the quality of the degree obtained?

- The third issue raised by ISIS is the financing of education. Currently, financing of education by the government has allowed the cost of education to remain inexpensive. However, due to increasing numbers and cost of staffing, government spending on education is on the increase. Hence, the debate between private vs. public financing (ISIS, 1996). As we have also noted, the Government is keen on passing the role of educating Malaysians into the hands of the private sector. But there are some barriers to this being fully implemented. Studies pertaining to the feasibility and how the private sector can take over may prove to be useful.[237]

The findings of these research initiatives will provide value-added information to the education and training sector in Malaysia.

Brain Drain

One phenomenon identified to have occurred in Malaysia in this thesis is the brain drain during the mid-1980s. Traditional theory views a brain drain as a manifestation of labour

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[237] For example, in this thesis, we have evidence that education and training funding by the private sector (or individual) is profitable given that we obtained positive rate of returns to education and training. There is then a need to examine or look into how increasing funding by the private sector could be organised and implemented.

mobility, which responds to wage differentials arising from the difference in the marginal productivity of skilled labour in different locations.

In Chen and Su (1995), the brain drain is not only an outright migration of skilled labour but includes the retention of students who fail to return home following the completion of advanced education in developed countries. In Malaysia, it is estimated that overseas Malaysian students comprise of about 70,000 to 80,000 in number (adapted from ISIS, 1998). We have also noted the outflow of skilled labour in the 1980s due to the recession at that time. The last study on brain drain in Malaysia that is known to us is that conducted by the Colombo Plan for Cooperative Economic Development in South and South-East Asia in 1972. This report concluded that there was no serious problem of brain drain in Malaysia. However, this study was done approximately 30 years ago.

The brain drain situation is inevitably different today compared to the situation in 1972. We have also noted that the Malaysian Government has already implemented its plans to entice Malaysians working overseas to return home. If more information on the condition of brain drain in Malaysia were available, it may be helpful to back up some of the steps that Malaysia intends to take and/or have taken to draw Malaysians living overseas to return home. In addition, it could also provide us with a better picture of the Malaysian brain drain condition.

The "Key" skills

One of the strategic sectors, which the Malaysian Government sees as a tool to achieve Vision 2020, is the Multimedia Super Corridor (MSC). The MSC is a specially zoned 15-km by 40-km information hub and will serve as an industry park for Information Technology (IT) companies. The MSC draws attention to the need for investments in IT and it embarks on laying the foundations for a knowledge-based society. The MSC will clearly increase the use of technology in Malaysia. The growing IT sector suggests several avenues for interesting research. One of them is the implication of technological changes on labour demand and the labour market (See Berman, et al., 1998 and Autor, et al., 1998).

In Chapter 4, we noted Green's (1998a) work, which identified the various key skills, which British employees could acquire and the return placed on each type of skill. In his study, computer skills were found to increase the value of a worker by 20 percent. Kanapathy (2001)[238] conducted a study on a sample of multinational companies (MNC) in Malaysia as part of a project on "Skill Shortages, Training Needs and HRD strategies of MNCs in APEC economies". A total of 100 companies responded to this survey.[239] Out of these 100 companies, 34 percent were from the manufacturing sector, 16 percent

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[238] In this study, two other firm level studies investigating skill and labour shortages were mentioned. They are Natarajan and Tan (1992) and Sieh Lee and Yew (1997).
[239] We have been informed via an electronic mail communication with Ms.Vijayakumari Kanapathy of ISIS that this survey was conducted locally while the data was processed and analysed by the Centre for Asia Pacific Social Transformation Studies (CAPSTRANS) in Australia. This study was funded by the Asia Pacific Economic Co-operation (APEC).

from the banking and finance sector, 34 percent from the business services sector and 16 percent from the insurance sector.

The survey results revealed that the manufacturing sector was highly affected by the lack of skills.[240] In relation to the specific skill deficiency, 90 percent of the manufacturing firms reported that there was a need to improve on management skills, interpersonal and communication skills, planning, new technology and job-related technical skills. The results had also indicated that literacy and numeracy skills did not seem to be a problem among the Malaysian MNC workforce. Studies like this conducted by APEC would be able to provide useful information to all parties, i.e. the Government, Employers and individuals regarding the education and training that is required in the country. However, a study of this nature should be conducted on a sample that is nationally representative so that the overall key skill condition in the country can be gauged.

In addition to this, we will find that there are currently no studies conducted on the impact of trade on human capital or one which investigates the relationship between trade and human capital (As noted in Chapter 8, see Gould and Ruffin (1995) and Green et al. (2000) noted in Chapter 7).

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[240] Kanapathy (2001) had differentiated the lack of skills into skill deficiency and skill shortage. According to Ms Kanapathy (via electronic mail communication), skill shortages referred to the numbers, i.e. difficulties encountered in recruiting people in the different occupational categories while skill deficiencies referred to specific job skills. In the latter questions, a list of job specific skills such as management and supervisory skills, interpersonal and communication skills and so on were given to the respondents in assisting them in replying to the skill deficiency question.

Also, from the review of the existing rate of return studies in Malaysia, we will find that most of the Malaysian studies have adopted a simple version of the human capital earnings function in their analyses. In Chapter 3 and 4, we have seen changes in the techniques used to analyse the rate of returns to education and training. We are convinced that researchers in Malaysia would find difficulty in applying and examining the other techniques derived to improve the measurement of the rate of returns in Malaysia. Most of the time this is hampered by the unavailability of strong data sets. Hence, this highlights the possibility of a wider scope of research pertaining to education and training in Malaysia if better data sets were available.

In conclusion, we believe that education and training has played a vital role in Malaysia's economic development and has the potential to continue doing so, especially in the light of new development strategies and policies giving emphasis to the education and training sector. We have also highlighted the need for future research to ensure the continuity of benefits from this sector of development.

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